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PROPOSED DRECP SCENARIO FOR WIND ENERGY RESOURCES

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I. SUMMARY

Approach. This proposal recommends two phases for implementation of the DRECP as pertains to wind energy development, each relating to a generally defined land area. Phase 1 would commence upon DRECP permit issuance and continue throughout the life of the plan. Phase 2 would commence no later than 2020, subject to the results of an adaptive management evaluation to be initiated no later than 2017.

Phase 1 of the DRECP would include three specific categories of land: Wind Development Focus Areas (Wind-DFAs), Neutral Areas, and Reserve Design Areas.

- **Wind-DFAs** include the highest quality wind resources that are within 10 miles of an existing transmission corridors and do not overlap with lands that have been classified as having special environmental concerns (ACECs and DWMAs). These areas would generally be avoided for acquisition as part of the Reserve Design unless deemed compatible with wind development. Projects locating in Wind-DFAs would receive maximum permit streamlining benefits for terrestrial species (e.g., limited survey requirements, fee-based mitigation programs, and regulatory assurances).

- **Neutral Areas** include lower-quality (but still potentially commercially viable) wind resources and high-quality resources within ACEC and DWMA areas, both within 10 miles of an existing transmission corridor. These areas would be open either to conservation efforts or wind development. Wind development may be subject to higher survey and mitigation requirements for terrestrial species (as compared with Wind-DFA areas), depending on available information and environmental sensitivities, but approved projects would be able to participate in fee-based mitigation programs and would receive the same regulatory permits and regulatory assurances as projects developed in the Wind-DFAs.

- Wind development would be prohibited in **Reserve Design Areas** unless it is specifically determined that wind development is compatible with the biological goals and objectives that are being met by the Reserve Design Area.

Avian species would be addressed as an overlay of sorts to each of the above areas. In all areas, developers would follow state and federal avian siting guidelines. Regulatory treatment of golden eagle and condor would be addressed specifically as described.

Wind Capacity Planning Figure, Statewide Context, and Related Transmission. The DRECP would plan for the potential development of at least 25,000 MW of wind energy capacity -- an additional 10,800 MW of wind capacity as compared to the CEC calculator's figure of 14,200 MW under the 60/40 wind/solar scenario for 2050. This figure is based largely on the assumption that more wind energy development will occur in the DRECP area versus elsewhere in the state, given the concentration of high-quality wind energy resources in the DRECP area. No decrease in the amount of other renewable resource types within the DRECP area is assumed (again, given the concentration of high-quality renewable energy resources in the DRECP area). Modest reductions are assumed in the amount of development of other renewable resources outside of the DRECP.

While the environmental impacts are therefore greater in the DRECP area, they can be expected to be lower overall, statewide, because harnessing superior wind resources in the DRECP will require fewer turbines to produce the same amount of energy, and fewer transmission corridors, substations, and power lines would be required statewide if development were concentrated in the DRECP area. An environmental analysis that looks only at the DRECP area, however, will account only for the greater impacts in that area and ignore the reduced impacts outside of the DRECP area, as well as the lower total impacts. This broader context needs to be appreciated somewhere within the DRECP decision-making process.

If realized, 25,000 MW of wind development would require 4% of the DRECP area in terms of lease area, and well under 1% of the DRECP area in terms of lands directly disturbed.

The complementary nature of wind and solar production indicate the likelihood that the transmission capacity that is designed to accommodate high penetrations of solar energy from the DRECP area also will be able to accommodate the majority of the wind generation proposed in this scenario.

Rationale. CalWEA's scenario preserves the state's highest-quality wind resource areas, recognizing the reality that numerous site-specific factors will determine whether, and to what extent, a wind energy project can be built at a particular site, and that these factors will not be controlled by the DRECP. Because as little as 10% of the land area that hosts commercially viable wind resources may ultimately prove to be developable, it is necessary to preserve for exploration as much of the commercially viable wind resource in the DRECP area as possible. Preserving the available wind resources will also foster competition among developers of wind projects and between other renewable energy technology developers, and thus enable the state's renewable energy and greenhouse-gas-reduction goals to be met at least cost.

CalWEA's proposal reduces environmental impacts by prioritizing for development areas with the highest-quality wind resources (reducing the number of turbines required) that are close to transmission corridors (avoiding new transmission corridors and long generation interconnection lines) and that do not overlap with lands that have been classified as having special environmental concerns (ACECs and DWMAs). The proposal recognizes the fact that ACEC and DWMA areas, which contain a variety of unique concerns and associated management prescriptions, have not been

studied for their compatibility with wind energy developments. By excluding these areas from the priority Wind-DFA, this scenario provides for any studies that may be necessary to understand any site-specific impacts and determine compatibility before a wind development is permitted.

II. DESCRIPTIONS OF DEFINED LAND AREAS

A. Priority Wind Resource Area (PWRA)

CalWEA has previously defined the Priority Wind Resource Area (PWRA) as:

- Lands in the DRECP area that host wind resources of sufficient quality that they are expected to be commercially viable well within the DRECP timeframe (wind speeds of 5 meters/second and above), *less*

- physical constraints (urban and buildout land, airports with a 9,000' buffer, and hydrological features[1]), *less*

  administrative constraints (National Park Service managed lands, Designated Wilderness Areas, Military Lands, National Wildlife Refuges, and California State Parks).

The PWRA is the area that CalWEA recommends be preserved as much as possible for potential wind energy development, given that 46 percent of commercially viable wind resources in the DRECP area is already unavailable for wind and other types of development due to the above-noted constraints.

B. Phase 1 PWRA

The Phase 1 PWRA is a portion of the PWRA comprised of areas that are within 10 miles of a transmission corridor, adding a few very small adjoining areas containing active or recently active wind developments (indicating potential viability despite being just outside the arbitrary 10-mile cut-off). Proximity to transmission is one of the primary factors that determine project viability. The Phase 1 PWRA is comprised of Wind Development Focus Areas, Reserve Design Areas, and Neutral areas, which are described next.

C. Wind Development Focus Area (Wind-DFA)

The Wind-DFA consists of:

- the Phase 1 Priority Wind Resource Area ***less***
- 5-6 m/s wind speed areas (unless part of an approved or active development area), and ***less***
- ACECs and DWMAs (as may be modified by the DRECP).

(The latter two categories are part of the "neutral" area, described below.)

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[1] Note that CalWEA had previously excluded active solar project areas from the PWRA, but now includes these areas, given the uncertainty of development of some of these projects and growing interest in joint wind-solar projects. These areas are relatively small.

D. Reserve Design Areas

Reserve Design Areas are lands that will be identified in the DRECP, designated for actions necessary to achieve the DRECP's biological goals and objectives.

E. Neutral Areas

Neutral Areas are lands within the Phase 1 PWRA that are not designated as either part of the Wind-DFA or the Reserve Design.

F. Phase 2 PWRA

The Phase 2 PWRA is the PWRA less the Phase 1 PWRA. This area will be subdivided into Wind-DFAs and Neutral Areas when Phase 2 evaluation is completed. The initial DRECP plan could include Reserve Design areas within the Phase 2 PWRA, with the considerations discussed below.

G. Map and Land Areas

Map 1, below, depicts the Phase 1 PWRA -- which is comprised of the Wind-DFA and Neutral Areas, and the Phase 2 PWRA (the remainder of the PWRA). As compared to the total DRECP area of 35,292 mi^2 (22.6 million acres), the PWRA is 13,570 mi^2 (8.7 million acres), the Phase 1 PWRA is 11,977 mi^2 (7.7 million acres), and the Phase 2 Area is 1,593 mi^2 (1.0 million acres). Within the Phase 1 PWRA, the Wind-DFA is 3,580 mi^2 (2.3 million acres) and the Neutral Area is 8,397 mi^2 (5.4 million acres).

The PWRA areas represent the areas that would be *available* for wind energy development, not the areas that would actually be developed. As discussed below, CalWEA believes that the DRECP should plan for 25,000 MW or more as the amount of wind capacity that might reasonably be needed to efficiently achieve California's greenhouse-gas reduction goals. Typically, 40 acres per MW (0.025 MW/acre) must be leased in order to preserve the wind resource supplying a project's wind turbines, and generally only 2%-5% of that area is physically disturbed.[2] Planning for 25,000 MW of wind capacity would therefore require approximately 1,563 mi^2 (1 million acres) of lease area, of which 31 to 78 mi^2 (20,000 – 50,000 acres) would be directly disturbed. Thus, as compared to the total DRECP area of 35,292 mi^2, planning for 25,000 MW of wind energy capacity would require 4% of the DRECP area in terms of lease area, and well under 1% of the DRECP area in terms of lands directly disturbed.

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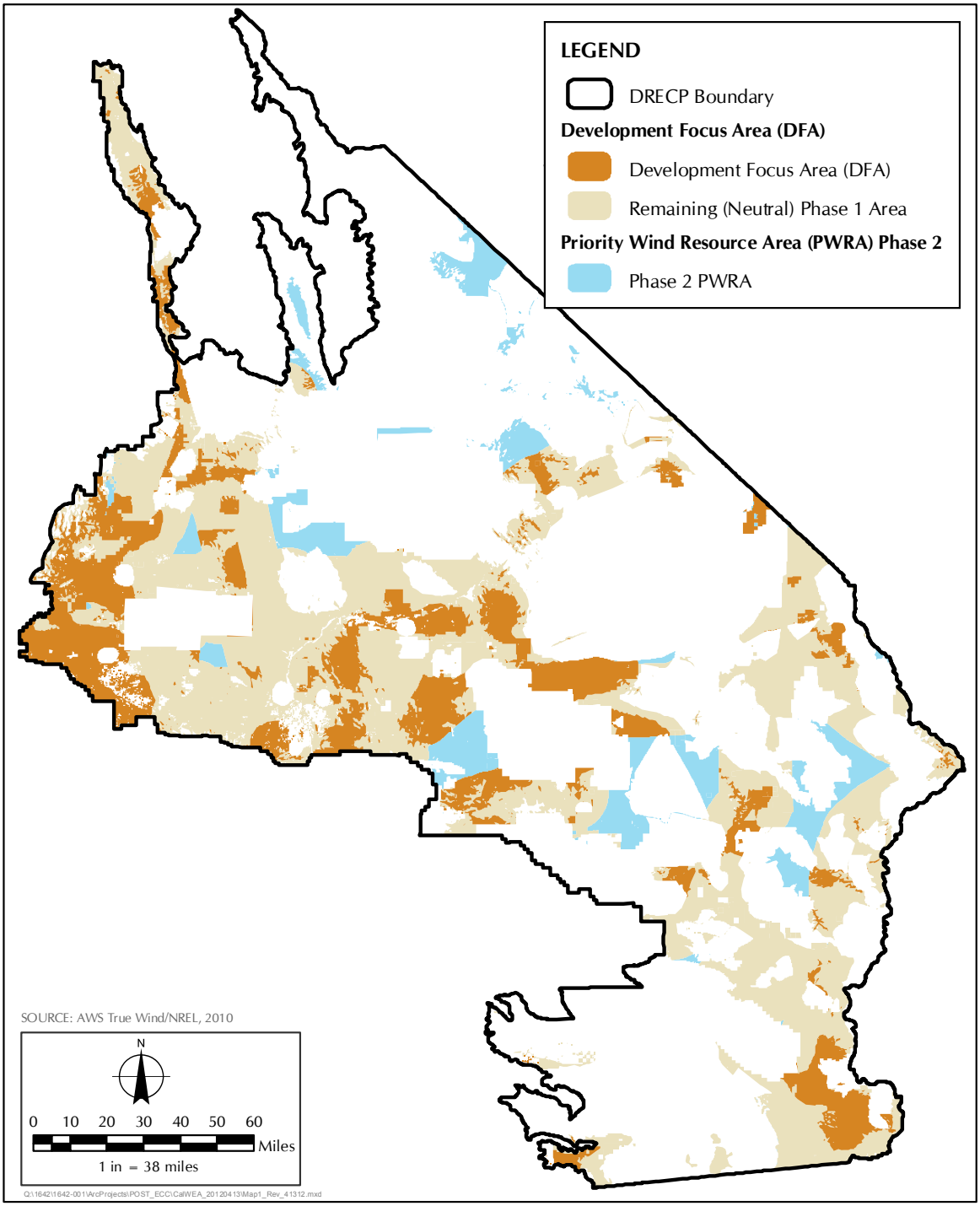
[2] See, e.g., *20% Wind by 2030; Increasing Wind Energy's Contribution to U.S. Electric* Supply, U.S. DOE (May 2008) at p. 110 (available at http://www.20percentwind.org/20percent_wind_energy_report_05-11-08_wk.pdf).

MAP 1 – Land Areas Comprising CalWEA Scenario for Wind Resources



CalWEA Proposed Alternative for Wind Energy Resources

III. REGULATORY TREATMENT OF DEFINED LAND AREAS

With the description of the associated land areas above, the Proposed Scenario for Wind Energy Resources is described as follows.

A. Wind Development Focus Area (Wind-DFA)

Projects locating in the Wind-DFA would receive maximum permit streamlining benefits for terrestrial species. Surveys and consultation with CDFG or USFWS for species such as Mohave ground squirrel and desert tortoise would be limited provided relevant standards are met. Incidental take authority would be delegated entirely to local agencies or BLM, fee-based mitigation programs would be available, and "No Surprises" assurances would be provided throughout the life of the plan (and, with respect to wind, the operational life of projects developed within the plan horizon). There would be low risk of program modifications due to adaptive management (except perhaps with respect to avian species in more sensitive areas) or other factors.

ACEC and DWMA areas are excluded from the Wind-DFA because, while wind development is not presently excluded automatically from ACEC and DWMAs (wind energy impacts were not considered in the development of BLM's Resource Management Plans for these areas), opportunities for development are determined by the management prescriptions for each individual area and any site-specific resource conflicts and impacts must be understood. Conducting such an analysis for all such areas within the time constraints for implementation of DRECP Phase 1 is not feasible.

The Wind-DFAs would be harmonized with local land use policies as much as possible at the outset of the DRECP policy.

B. Reserve Design Areas

These areas, to be defined in the DRECP development process, will serve as the backbone for the conservation strategy, and would be the primary focus of the DRECP's acquisition efforts or, on public lands, management requirements.

Wind development would be prohibited in Reserve Design Areas (lands designated for actions necessary to achieve the plan's biological goals and objectives) unless it is specifically determined that wind development is compatible with the biological goals and objectives that are being met by the Reserve Design Area.

Wind energy projects may be compatible with some reserve, corridor and buffer areas, and wind project development areas can support viable populations of many sensitive taxa, as well as wildlife movement, presuming careful siting, mitigation and monitoring. This stems from wind energy's small ground disturbance footprint and the ability to carefully micro-site turbines. Compared to many other types of development, wind energy projects offer considerably lesser impacts, and positive population growth may be possible for sensitive species in project areas. The co-location of wind energy projects and sensitive species or ecological communities could facilitate the ability to identify and secure large, contiguous reserve areas while simultaneously preserving high quality wind resource areas for development.

Unless deemed compatible with wind developments, planners should avoid identifying Reserve Design Areas within the Phase 1 PWRA, particularly within the Wind-DFA, limiting such areas to those deemed critical to the achievement of the DRECP's conservation goals.

C. Neutral Areas

Phase 1 PWRA areas not designated as either a Wind-DFA or as part of the Reserve Design would be designated as Neutral Areas, open to either wind development or additions to the Reserve Design after approval of the DRECP, consistent with local land use policies.

In the case of wind development, the Neutral Area would alleviate the market constraints that would be posed by limiting development to the Wind-DFA area (e.g., military and other conflicts that could severely limit the ability to develop in the DFA). Additional biological surveys for terrestrial species *may* be needed (particularly in ACEC or DWMA areas) if there are critical information gaps. Any proposed development would also be evaluated for consistency with those criteria developed for the DRECP Interim Process (e.g., foreclosing a wildlife corridor or essential connectivity). Moreover, mitigation requirements may be somewhat higher, both to encourage industry to focus on the Wind-DFA as much as possible, and in recognition of the fact that lands outside of the Wind-DFAs will include ACEC and DWMAs and other potentially sensitive areas. As with Reserve Design Areas, however, ACEC and DWMAs should be evaluated for their compatibility with wind energy developments.[3]

As a result, development within the neutral zone would be less streamlined than development in the primary zone, but development that is authorized would be able to participate in fee-based mitigation programs, be covered by the incidental take permits issued at plan inception, and continue to receive "No Surprises" assurances throughout the life of the plan (and, with respect to wind, the operational life of projects developed within the plan horizon).

In the case of the conservation efforts, the Neutral Area designations would allow conservation efforts outside of the initially identified Reserve Design Area if market conditions dictate or such acquisitions would add value, for biological reasons, to the lands already targeted for acquisition or special management. There would need to be some demonstration that the acquisition (or management affecting BLM lands) contributes to the overall Reserve Design, does not detract from the financial viability of the DRECP, and is consistent with local land use policies (whether related to renewables or other land uses). Other conservation criteria may be developed for these zones during the DRECP planning process.

Based upon the science developed or assembled for the DRECP after it is adopted, Neutral Areas could later be divided into additional conservation zones and/or additional Wind-DFAs.

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[3] Wind development may be compatible, for example, with desert tortoise populations. See Lovich et al., "Effects of Wind Energy Production on Growth, Demography, and Survivorship of a Desert Tortoise (Gopherus Agassizii) Population In Southern California With Comparisons To Natural Populations," Herpetological Conservation and Biology, 6(2):161-174.

D. Phase 2 PWRA

Due to the lack of proximity to transmission lines, which are unlikely to make these areas attractive in the near-term market for renewable energy, no wind development would occur in the Phase 2 area until at least 2020.[4] However, there would be a mandated revisiting of Phase 2 areas in 2017, with an evaluation completed no later than 2020.

The decision as to which portions of the Phase 2 area would be designated as a Phase 2 Wind-DFA (or as Neutral Areas) would be based on additional environmental data, experience developing in Phase 1 areas, the state of renewable energy market competition, achievement of the state's clean energy goals, and other factors. DRECP planners should strive to avoid identifying Reserve Design Areas within the Phase 2 area, particularly in areas with wind resources of 6 m/s and above, unless deemed critical to the achievement of the DRECP's conservation goals, or deemed compatible with wind development.

E. Avian Issues & Permits for Golden Eagle & Condor

With regard to avian species generally, in all PWRA areas (Wind-DFA, Neutral and Reserve Design where permitted), developers would follow state and federal siting guidelines.[5] Regulatory treatment of golden eagle and condor would be addressed specifically as follows.

The U.S. Fish and Wildlife Service (May 2011) has recognized that compliance with the Bald and Golden Eagle Protection Act (BGEPA) may be accomplished through incidental take permits issued under a Habitat Conservation Plan (ESA Section 10(a)(1)(b)), provided the regulatory standards established by the BGEPA are satisfied. Accordingly, the DRECP will cover eagle take and provide an alternative vehicle from the separate permit processes being established under BGEPA. As set forth below, and as acknowledged in the USFWS May 2011 field guidance, take coverage for eagles (and associated regulatory assurances) will be offered throughout the life of the plan and the subsequent operation of projects constructed within that time frame, subject to adaptive management provisions that are responsive to ongoing monitoring of eagle populations.

In particular, and as largely set forth in CalWEA's September 2011 comments on the NOI/NOP for the DRECP:

- The DRECP should establish a permit term for eagle take that covers the operational life of any wind project developed within the initial term of the DRECP;

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[4] As this 10-mile delineation is somewhat arbitrary, the DRECP should provide for limited use of Phase 2 areas that are contiguous parts of projects located primarily in the Phase 1 area.

[5] CEC/CDFG's "California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development" and the USFWS' "Land-Based Wind Energy Guidelines." These guidelines should eventually be combined and harmonized.

- The DRECP should provide regulatory assurances relative to golden eagle consistent with USFWS' "No Surprises" policies, which assurances should not be undermined by an unnecessarily open-ended adaptive management program;

- The DRECP should provide programmatic permit coverage for all projects within the permit area, requiring only that applicants submit project-tailored avian and bat protection plans that include mitigation and monitoring measures to address golden eagles;

- The DRECP should allow project developers the choice of where to site projects by taking into account DRECP micro-siting requirements related to golden eagle, which would satisfy BGEPA, and should require minimization and mitigation only for risk of actual take of eagles specific to the project area and activities. That take would be compensated for under a DRECP no-net-loss program specific to the plan area.[6] That program should include the only mitigation method that has been accepted by the USFWS to date – utility power pole retrofitting – as well as other accepted methods that may be developed.[7]

- The DRECP should support comprehensive research on region-wide golden eagle population trends rather than require individual project developers to perform rigorous scientific surveys or risk analyses in connection with their projects;

- When an existing project has complied with the DRECP and coordinated with USFWS, it should not be required to modify operations or face the possibility of shutdown;

Upon initial issuance of take permits under the DRECP, eagle take coverage would be issued based upon best available scientific information at the time, including population data and available mitigation options.[8] Prior to the end of the fifth year of DRECP implementation, as more information becomes available, appropriate adjustments can be made to any avoidance, minimization or mitigation measures identified in the original plan. Subsequent five-year reviews would occur throughout the life of the plan. Although incidental take authorization would be provided up front, that coverage will be conditioned upon compliance with the plan provisions as they may be adjusted

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[6] If compensation for the relevant population can be achieved more effectively through programs implemented outside of the plan area, the program should allow for that.

[7] CalWEA is now sponsoring research to synthesize knowledge of eagle fatality sources and develop potential mitigation strategies that will enable project developers to propose, or the DRECP conservation trust to develop, viable alternative methods of mitigation. This research will be completed by June 2012.

[8] CalWEA is currently sponsoring a proposal to conduct research on golden eagle populations in the DRECP area; this proposal was submitted in January to the CEC's PIER program in response to a grant opportunity. If the project is funded, CalWEA's research team will create a nest density map and produce a report on the California desert Golden Eagle population distribution by third quarter 2013, and produce a peer-reviewed report summarizing population dynamics in 2014.

from time to time. At no time will permit coverage lapse for an operating project during the life of the plan.

By the same token, take coverage for California condor will be extended upon initial DRECP issuance, subject to adaptive management that responds to information developed for an updated Condor Recovery Plan, which in turn will be supported by the research results of the Condor Wind Working Group and industry initiatives. This effort will be completed no later than five years following DRECP approval. Although initial take coverage would be limited to harassment or harm arising from hazing or similar activities, or any identified loss of foraging habitat, direct take coverage would not be available until, at the earliest, completion of the initial, 5-year condor study effort.

F. Amount of Wind Development To Plan For

CalWEA's wind scenario accepts the overall results of the CEC calculator as a reasonable figure for the total amount of renewable energy that may be needed in 2050 to achieve the state's greenhouse-gas reduction goals. CalWEA proposes, however, that the state plan for the possibility that at least 25,000 MW of wind development may be needed in the DRECP area as compared to the CEC calculator figure of 14,200 MW.

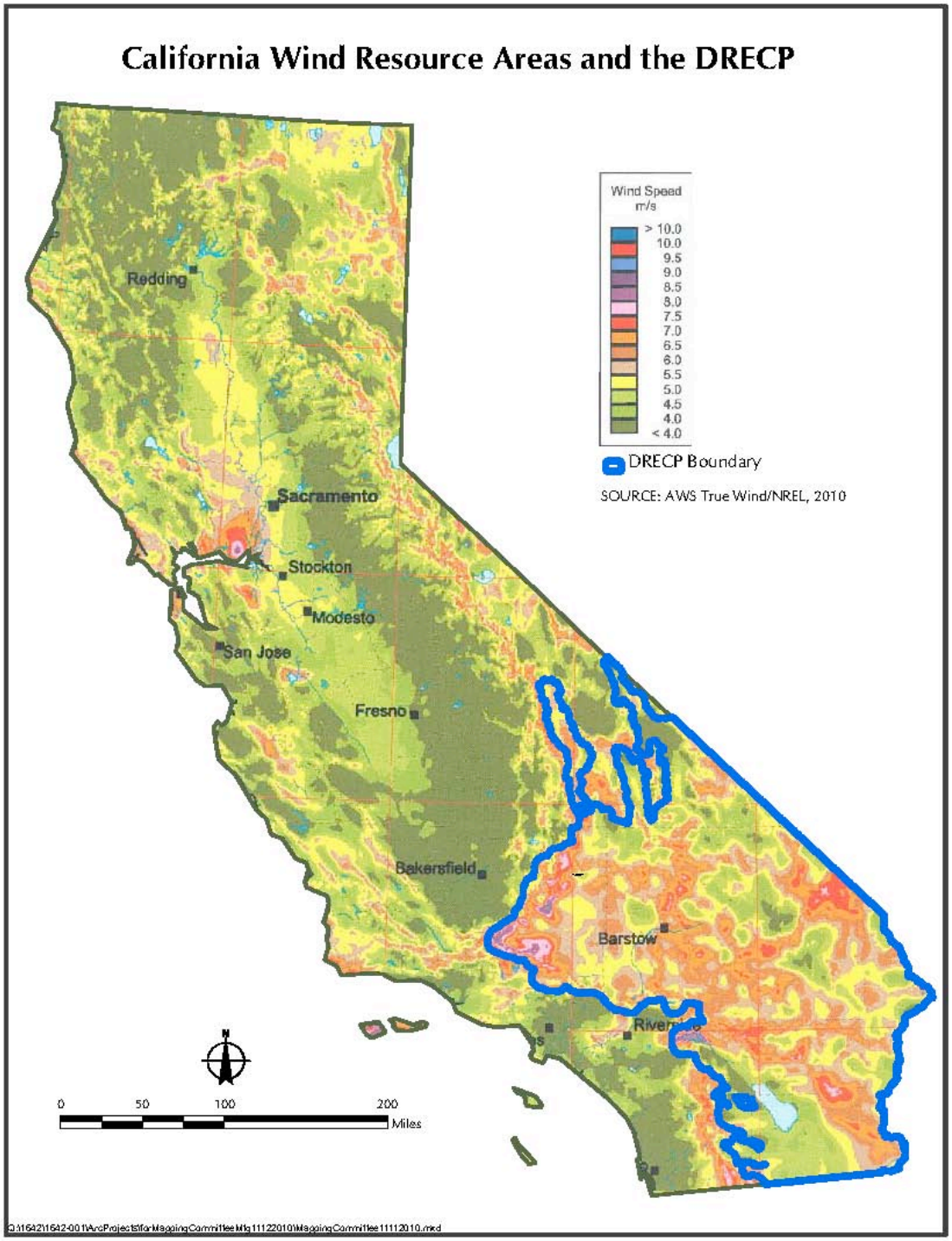
This wind scenario assumes the addition of 10,800 MW of wind capacity in the DRECP area to the CEC calculator figure of 14,200 MW, *without decreasing the amount of other renewable resources within the DRECP area*. As explained below, there should be no decrease in other renewables since 7,100 MW of the additional wind replaces non-DRECP-area California wind, and the balance of 3,700 MW of additional DRECP wind could replace non-DRECP-area California solar and geothermal renewables, given (as with wind) the high quality of those renewable resources within the DRECP area. The DRECP should initially plan for this development to occur in the Phase 1 area. Whether the Phase 2 area is needed due to military and other conflicts in the Phase 1 area can be determined when Phase 2 is considered.

Countless assumptions were made in the CEC calculator leading to the figures it produced, as CEC staff readily acknowledges. The technology-specific figures appear to be particularly subjective. CalWEA believes that the calculator's wind figure for the 60/40 wind/solar case for 2050 of 14,200 MW is far too low, and that the following revised assumptions readily support a figure of 25,000 MW:

1. To begin with, consider that the technical maximum potential for wind in the PWRA area (i.e., covering the PWRA with wind turbines spaced at 40 acres/MW) would provide 240,000 MW of capacity. Thus, for practical purposes, there is no technical limit, since we know that viable technology to capture the wind resource exists today: all we would need to do would be to deploy the technology. This is not the case for geothermal technology, for example, as was described in the Geothermal Energy Association's (GEA) presentation to the DRECP stakeholders.

2. By changing a few assumptions in the CEC calculator, one can easily produce a reasonable figure for wind of 25,000 MW or more. First, given that the state's highest-quality wind resources are concentrated in the DRECP region (see **Map 2**, below), it can very

MAP 2 - California Wind Resource Concentration in the DRECP Area (at 80 m)



reasonably be assumed that 75% of California's wind energy resources will be developed in the desert -- as has been occurring recently -- vs. the calculator's assumption of 50%. This assumption would add 7,100 MW of wind to the CEC calculator's figure of 14,200 MW of wind energy development that could occur in the DRECP area, for a total of 21,300 MW.

3. Next, one could reasonably adjust downward the CEC calculator figure of 3,000 MW for geothermal outside of the DRECP area in the same 2050 case, or the 4,000 MW of geothermal inside the DRECP area.[9] As was stated by the GEA in its presentation to DRECP stakeholders,[10] there is no certainty of the geothermal resource potential over 2,000 MW within the DRECP area, and the CEC's David Vidaver described the 7,000 MW statewide geothermal figure in the calculator as "stretching the envelope."[11] Replacing 1,000 MW of geothermal from the DRECP area would require roughly three times that capacity in wind generation capacity, due to high geothermal capacity factors. This would add roughly 3,000 MW of DRECP wind capacity to the CEC calculator figure, again assuming this capacity is located within the DRECP area given the superior wind resources there. Together with revised assumption #2, this would bring total DRECP wind capacity to 24,300 MW.

4. Similarly, it would not be unreasonable to adjust significantly downward the assumed statewide figure of 34,000 MW for rooftop & distributed photovoltaics (PV) that the calculator assumes -- those figures are very high, the inverse of Germany's experience with wind and solar PV, for example.[12] Likewise, depending on technological and economic factors over the next 40 years, some portion of the nearly 18,000 MW of assumed central solar thermal and solar PV also could shift to wind. Combined with revised assumptions 2 and 3, just 700 MW of solar generation resources outside of the DRECP, yielding 700 MW of additional wind generation inside the DRECP area, would produce a total of 25,000 MW of wind within the DRECP area.

5. Various combinations of the previous three factors – e.g., more geothermal and less solar, or a higher fraction of total statewide wind development occurring in the DRECP area -- could lead to a total 2050 DRECP figure of at least 25,000 MW of wind development or more. As described in Section II.G, planning for 25,000 MW of wind energy capacity would require 4% of the DRECP area in terms of lease area, and well under 1% of the DRECP area in terms of lands directly disturbed (**Map 3**).

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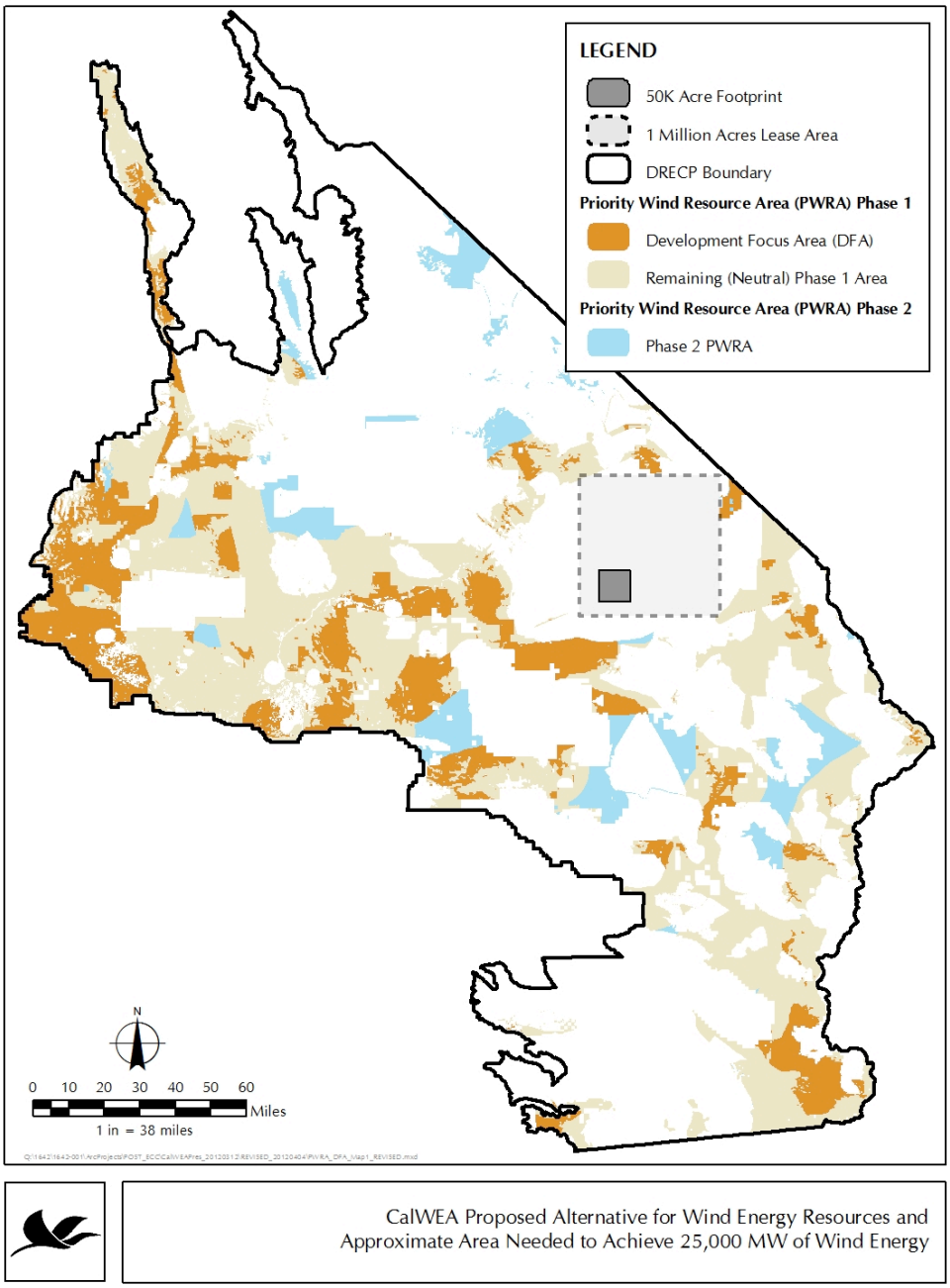
[9] This is not to suggest that planning should not occur for this larger amount of geothermal. As explained below, we should plan for the high-side case for each type of renewable resource so as not to foreclose any reasonably possible future.

[10] "Geothermal Siting and Permitting Considerations in the DRECP Planning Area," Geothermal Energy Association, November 2011.

[11] November 9, 2011, DRECP Stakeholder Meeting.

[12] Even after several years of expensive "feed-in-tariff programs" (now being ratcheted back in the face of Europe's financial crisis), in 2010, 17,000 MW of PVs provided 11% of Germany's renewable electricity versus 36% from wind. So far, there has been no appetite expressed in the U.S. for paying the high FIT rates that have been paid in Europe: 19 billion euros have been invested in the construction of PVs in Germany, versus 2.5 billion euros in wind. (Source: www.bmu.de/english/renewable_energy/doc/39831.php)

Map 3 – Approximate Area Needed for 25,000 MW of Wind Generating Capacity



G. Context for Additional Wind in the Environmental Analysis

As described in the previous section, this scenario assumes that some 10,800 MW more wind development may occur in the DRECP area than what is assumed in the CEC calculator; this capacity would replace some combination of wind, geothermal and solar resources in *other* regions of California, given the superior quality of renewable resources located in the DRECP. While the environmental impacts are therefore greater in the DRECP area, they can be expected to be lower overall, statewide, due to two factors:

(a) the power in the wind is a cubic function of the wind speed (for example, if the wind speed doubles, the energy output will increase by a factor of 8). Thus, the greater wind energy intensity in the DRECP will require significantly less land to be developed and fewer turbines to be installed than were the same amount of wind energy to be generated from capacity developed outside of the DRECP in California. This is because it is unlikely that sufficient lands could be secured for wind development in the far more limited areas of equivalent wind resources outside the DRECP, thus requiring development is areas of lesser wind resource value;

(b) fewer transmission corridors, substations, and power lines would be required statewide if development were concentrated in the DRECP area (versus accessing the equivalent amount of high-quality wind, solar and geothermal resources scattered around the state outside of the DRECP, or accessing more widely available resources of lesser quality outside of the DRECP – see generally available renewable resource maps showing a concentration of high-quality renewable resources in the DRECP area).

An environmental analysis that looks only at the DRECP area, however, will account only for the greater impacts in that area and ignore the reduced impacts outside of the DRECP area, as well as the lower total impacts. This broader context needs to be appreciated somewhere within the DRECP decision-making process.

H. Conceptual Transmission Plan

As compared with the transmission plan that will be developed for the Renewable Energy Study Area (RESA) alternative, the following considerations should be taken into account with regard to the modifications required for this wind scenario (only for purposes of an environmental and economic analysis – see comment below regarding actual transmission planning):

1. Wind energy production has a daily profile that is generally complementary to solar production (solar declines in the late afternoon as wind production rises – see **Figures 1 and 2**). It is likely, therefore, that when the transmission system is sized to accommodate high penetrations of solar energy from the DRECP area (nearly 24,000 MW under the CEC calculator's high-wind 2050 scenario), the same transmission capacity will be able to accommodate the majority of the wind generation proposed in this scenario. This would be particularly true once out-of-state baseload coal units in the Southwest are retired as greenhouse-gas goals are increasingly met. If limited amounts of curtailment (or storage units) were used to address transmission congestion, as compared to building sufficient transmission to carry every last kilowatt-hour, any additional transmission build-out beyond what would be required to deliver solar and geothermal generation alone could be avoided.

2. Presuming that the variety of development factors discussed in section IV.C below do not substantially preclude wind development in the PWRA Phase 1 area, there are sufficient wind resources available in that area – which is defined by its proximity to

transmission lines – to reach the wind scenario planning figure of 25,000 MW. Thus, no new transmission corridors should be needed to meet that goal (see **Map 4**, below, showing existing corridors and wind scenario areas).

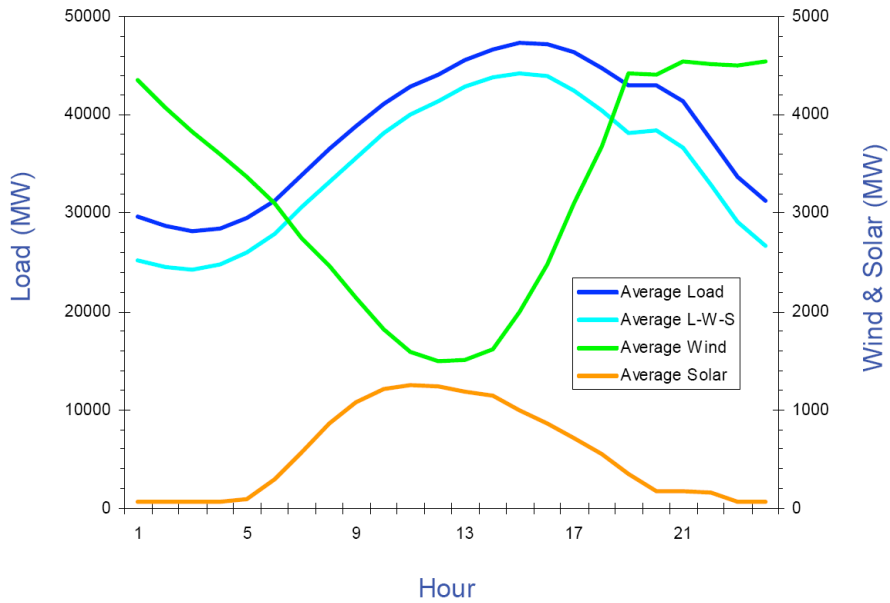


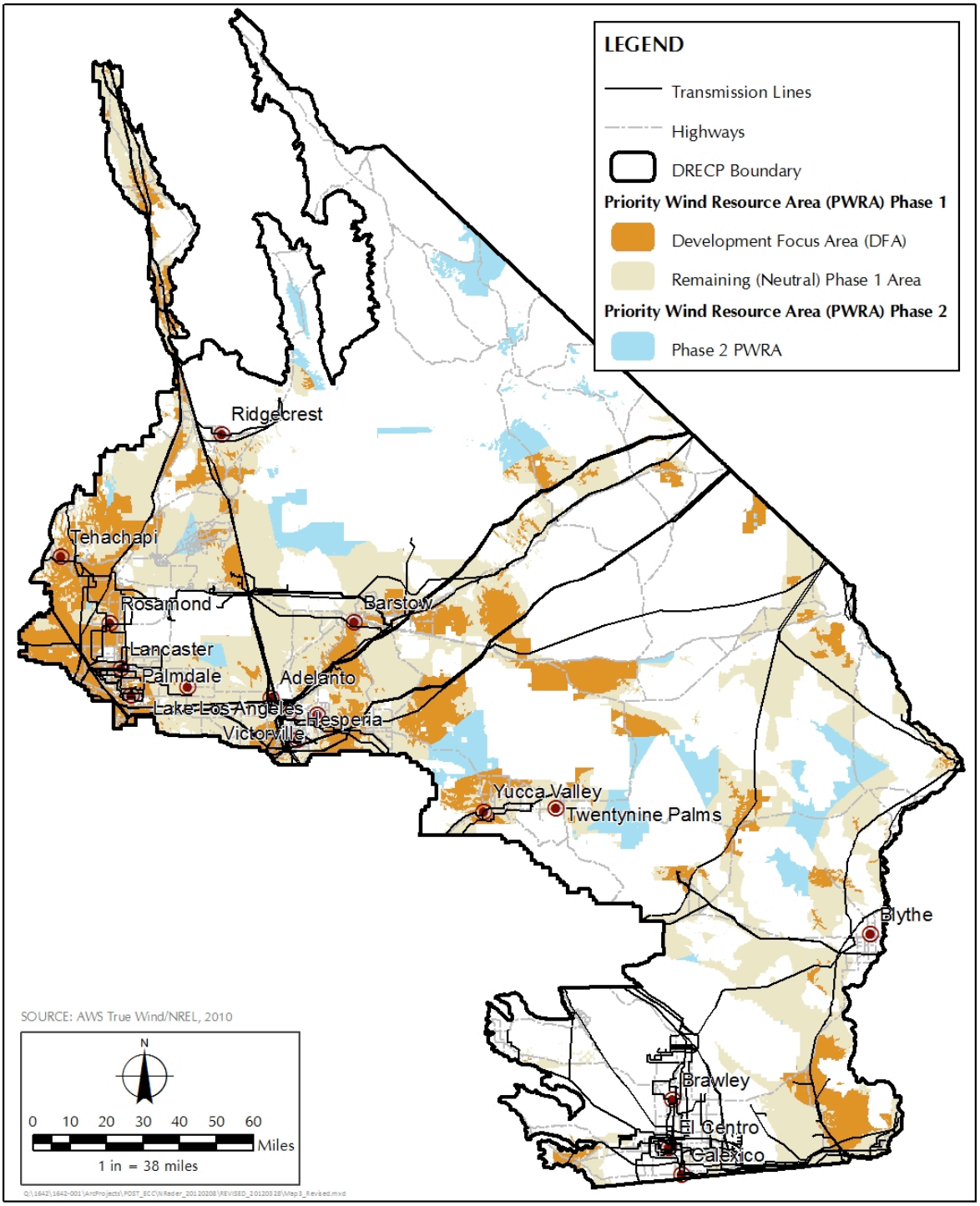
FIGURE 1. California average wind and solar output, along with net demand. Sources: Intermittency Analysis Project, California Energy Commission 2007 (GE2 020807) & NERC *Accommodating High Levels of Variable Generation (April 2009)*

CREZ Name	CREZ Number		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Tehachapi	52	January	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.07	0.17	0.14	0.14	0.17	0.26	0.32	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
		February	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.04	0.28	0.27	0.22	0.19	0.23	0.28	0.35	0.19	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
		March	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.04	0.43	0.54	0.57	0.57	0.58	0.62	0.64	0.65	0.64	0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
		April	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.36	0.61	0.64	0.62	0.64	0.63	0.62	0.64	0.63	0.61	0.21	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
		May	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.11	0.63	0.70	0.73	0.76	0.74	0.76	0.74	0.74	0.72	0.71	0.46	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
		June	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.23	0.75	0.82	0.85	0.85	0.83	0.82	0.83	0.83	0.81	0.79	0.65	0.06	-0.01	-0.01	-0.01	-0.01	-0.01
		July	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.10	0.73	0.85	0.86	0.86	0.86	0.85	0.84	0.84	0.85	0.83	0.67	0.06	-0.01	-0.01	-0.01	-0.01	-0.01
		August	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.59	0.85	0.88	0.87	0.86	0.84	0.84	0.84	0.85	0.81	0.43	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
		Septembe	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.34	0.82	0.81	0.79	0.75	0.70	0.75	0.74	0.76	0.61	0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
		October	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.00	0.43	0.56	0.53	0.52	0.51	0.50	0.65	0.63	0.18	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
		November	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.04	0.28	0.28	0.23	0.25	0.31	0.37	0.27	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
		December	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.09	0.17	0.13	0.14	0.19	0.27	0.20	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01

CREZ Name	CREZ Number		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Tehachapi	52	January	0.24	0.23	0.23	0.22	0.20	0.21	0.22	0.19	0.17	0.17	0.19	0.21	0.24	0.26	0.27	0.28	0.24	0.23	0.23	0.23	0.23	0.24	0.24	0.24
		February	0.32	0.30	0.28	0.27	0.23	0.22	0.22	0.21	0.22	0.24	0.26	0.31	0.35	0.36	0.37	0.35	0.32	0.32	0.31	0.30	0.32	0.35	0.34	0.34
		March	0.38	0.38	0.36	0.35	0.31	0.30	0.31	0.27	0.28	0.31	0.33	0.36	0.36	0.35	0.36	0.36	0.36	0.37	0.39	0.38	0.38	0.41	0.40	0.39
		April	0.44	0.42	0.40	0.39	0.37	0.35	0.33	0.31	0.30	0.34	0.37	0.41	0.45	0.49	0.53	0.57	0.61	0.61	0.61	0.58	0.56	0.53	0.50	0.47
		May	0.51	0.47	0.45	0.42	0.38	0.33	0.29	0.24	0.22	0.23	0.26	0.29	0.34	0.40	0.46	0.53	0.67	0.67	0.67	0.64	0.64	0.63	0.58	0.55
		June	0.54	0.49	0.46	0.43	0.40	0.36	0.30	0.23	0.20	0.20	0.20	0.22	0.27	0.35	0.43	0.49	0.67	0.69	0.70	0.69	0.69	0.68	0.62	0.56
		July	0.40	0.36	0.33	0.28	0.24	0.19	0.14	0.10	0.09	0.09	0.10	0.12	0.17	0.24	0.33	0.43	0.60	0.63	0.66	0.64	0.62	0.58	0.52	0.45
		August	0.39	0.35	0.31	0.29	0.25	0.22	0.18	0.13	0.11	0.12	0.13	0.15	0.21	0.29	0.38	0.46	0.58	0.58	0.61	0.59	0.55	0.52	0.47	0.43
		Septembe	0.33	0.32	0.29	0.27	0.24	0.23	0.21	0.17	0.14	0.16	0.17	0.19	0.21	0.26	0.30	0.32	0.36	0.40	0.41	0.38	0.37	0.39	0.37	0.35
		October	0.31	0.29	0.28	0.28	0.24	0.22	0.22	0.18	0.14	0.14	0.17	0.19	0.22	0.24	0.28	0.31	0.35	0.36	0.41	0.39	0.37	0.36	0.33	0.33
		November	0.31	0.31	0.32	0.31	0.28	0.28	0.26	0.23	0.22	0.24	0.26	0.30	0.30	0.30	0.30	0.28	0.24	0.26	0.28	0.27	0.28	0.28	0.29	0.31
		December	0.29	0.28	0.27	0.28	0.22	0.22	0.22	0.22	0.21	0.22	0.23	0.26	0.28	0.31	0.34	0.32	0.27	0.28	0.30	0.32	0.32	0.32	0.31	0.30

FIGURE 2. Average solar and wind generation in Tehachapi region. Average solar (top graph) and wind (bottom graph) generation profiles in the Tehachapi renewable generation area showing very little overlap in peak generation (Source: CAISO 2020 Renewable Transmission Conceptual Plan, September 2009 – see http://www.caiso.com/Documents/2020RenewableTransmissionConceptualPlan_BasedonRETIProcessStudyResultsInputs_.pdf)

MAP 4 – Existing Transmission Corridors & Wind Scenario Land Areas



CalWEA Proposed Wind Energy Development Focus Area and Transmission Corridors

The above considerations are relevant to analyzing the environmental impacts of transmission for the wind scenario. For purposes of developing a conceptual transmission plan for the DRECP (following adoption of the DRECP), that should be done using a "least-regrets" approach that considers various renewable energy market outcomes.[13] The conceptual plan should be based on the transmission corridors that are common to all possible scenarios, consistent with our argument above that the DRECP should not preclude any reasonably possible energy future.

IV. RATIONALE FOR WIND SCENARIO

A. Preserve Access to California's Best Wind Energy Resources

Unconstrained, about 70% of the DRECP area contains commercially viable wind resources. After removing physical and administrative constraints (such as military bases and National Park Service managed lands), only about half of the DRECP area's commercially viable wind resources remain available for development, subject to numerous potential development barriers (see section IV.C below) that can be expected to further reduce commercially viable areas. CalWEA's scenario preserves this Priority Wind Resource Area for exploration in support of the cost-effective achievement of California's clean-energy goals.

As is clear from Map 2, above, the state's best wind resources are concentrated in the desert, where 75% of recent in-state wind development has been occurring.[14] Stronger winds are always better, particularly because the power in the wind is a cubic function of the wind speed. For example, if the wind speed doubles, energy output will increase by a factor of 8. Even as wind technology improves, more energy can always be extracted from a windier site. Therefore, it is essential that California preserve access, as much as possible, to the state's best, most economic wind resources.

Although higher wind speeds are always more desirable, the "neutral" area within CalWEA's PWRA includes lands with wind resources as low as 5 meters/second, even though those areas are not generally being developed in California today. There are several reasons for this:

(1) model-based resource maps are not always accurate – when meteorological equipment is installed to actually measure the wind in particular places, substantial differences are occasionally found (sometimes as much as a full wind resource class or more);

(2) turbine manufacturers are working to optimize turbines to capture lower average wind speeds, as **Figure 3** illustrates; and

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[13] CalWEA has written extensively on the benefits of and appropriate technical approach to least-regrets transmission planning in stakeholder proceedings at the California Independent System Operator and before the Federal Energy Regulatory Commission.

[14] Map 2 shows wind speeds at 80 meters above ground. By comparing California Energy Commission wind speed maps at 70 m (http://www.energy.ca.gov/maps/renewable/wind/WIND_SPEED_70M.jpg) and 100 meters (http://www.energy.ca.gov/maps/renewable/wind/WIND_SPEED_100M.PDF), one can see that the picture does not dramatically change at different potential hub heights.

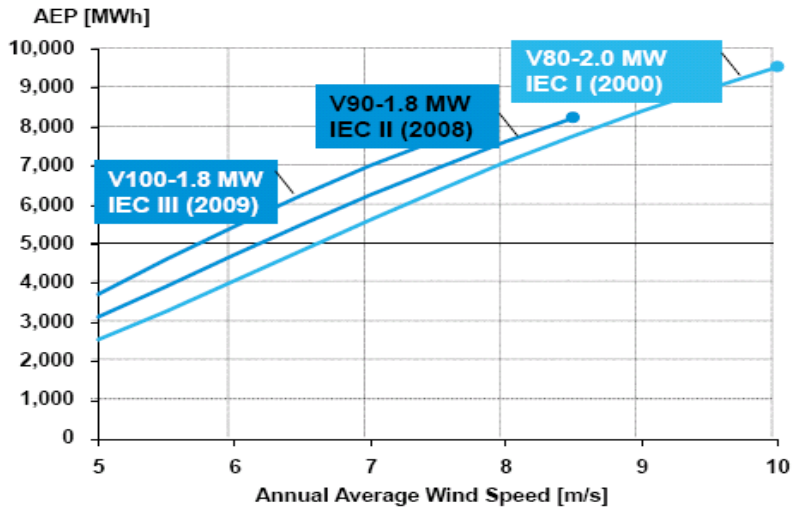

FIGURE 3. Wind Technology Advancements Are Capturing Lower Wind Speeds.
This figure shows how Vestas's newer turbines capture more energy from the same wind speeds, making lower-wind-speed sites more viable. It also shows that higher wind speeds are always more desirable. (Source: Vestas, adapted by CalWEA.)

(3) as higher wind-speed sites are developed (or if they cannot be accessed due to various constraints), 5 m/s areas are expected to become commercially viable.

These areas should therefore be included when planning over the long-term, as we are under the DRECP.

B. Plan for a Reasonable Upper-Bound Estimate of Wind Energy

Generally, the DRECP should plan for an amount of wind *and each other* technology that is an *upper-bound estimate of the reasonably possible*, for these reasons:

- No one has a crystal ball. The DRECP planners do not have perfect information on future energy policies, market conditions, environmental impacts, technology advancements, raw materials prices, consumer behavior, etc., over the next 40 years. No reasonably possible future should be precluded by relatively arbitrary decisions made under the DRECP today;

- High-end planning figures will not preordain the development of those amounts for any technology (and certainly not the sum of the high-end figures for these competing technologies). What actually is developed will be determined by the same factors that we cannot now predict;

- Preserving competition among and between technologies is essential to keep costs down in achieving California's greenhouse-gas reduction goals - *cost will matter* in society's ability and willingness to pay to achieve those goals;

- The DRECP is not a forum for renewable energy policy or market planning – it is to plan for possible renewable energy development needs and the associated conservation that would be required; and

- Under NCCPs, mitigation must stay ahead of impacts. So "pay ahead as you go" will ensure appropriate mitigation for the amount of development (of whatever type) actually occurs.

If achieving our greenhouse-gas-reduction goals is California's over-arching priority, then, for the above reasons, we need to err on the high side for each type of renewable energy technology -- we have to apply the "precautionary principle" to renewable energy planning as well as to conservation planning.

Therefore, the DRECP should plan for the possible development of a reasonable upper bound estimate of the amount of renewables that may be needed, including a variety of possible technology mixes within that total. In planning for these scenarios, the DRECP should not include technology-specific estimates that could translate into technology-specific caps under the final plan. The plan should also make clear that, in planning for an upper-bound scenario, it is in no way mandating such an outcome; rather, a variety of policy, technology, market and other factors will determine the extent to which renewable energy resources of various types are needed in the desert to achieve the state's broader environmental and energy goals.

C. Maintain Siting Flexibility to Ensure that Potentially Needed Wind Energy Can Actually Be Obtained

The land available for development under the DRECP should reflect the fact that it will not be possible, in a planning process that covers tens of thousands of square miles, to understand and address all of the numerous site-specific factors that will determine whether, and to what extent, a wind energy project can be built at a particular site. Once these factors become understood, a small fraction of the land hosting good wind resources may be suitable for wind development. CalWEA's proposal addresses this reality by preserving for possible development all of the land that could potentially host wind projects, prioritizing those areas with the highest quality wind resources that are close to transmission corridors and do not overlap with lands that have been classified as having special environmental concerns (ACECs and DWMAs).

There are many site-specific factors that will not be fully evaluated or controlled by the DRECP process that will reduce the availability of the otherwise commercially viable wind resources indicated by the PWRA map. These factors include:

(1) confirmation of local wind resources. Wind resource maps are based on models for area blocks, rather than meteorological measurements at specific points, and thus are not always precise. It is not uncommon to find differences of 1 to 2 meters/second between the estimates of wind speed on a general map and actual measurements by instruments at specific locations on met towers;

(2) interference with military radar and flight patterns. In many cases, mitigation on a site-specific basis is required to determine potential compatibility. (Compatibility cannot be broadly determined from general military interference maps – it is not uncommon for areas shown to be incompatible to become available after further study and mitigation, and for areas shown to be compatible to prove incompatible after further study);

(3) the ability to lease land rights, including rights to land providing transmission access;

(4) geotechnical studies to determine feasibility of construction;

(5) numerous exclusion areas or setback requirements to address various issues such as avian concerns (e.g., eagle nests), terrestrial environmental concerns, cultural resources, transmission lines, aqueducts, residences, streams, and other features of the land.

It is not unusual for as little as 10% of a land area that is initially identified as suitable for a wind project ultimately to be developable.[15] There are many other cases where the conflicts become insurmountable and the development is abandoned altogether.

D. Facilitate Achievement of the State's Greenhouse-Gas Reduction Goals at Least Cost

In transforming its economy to one that is fueled largely by renewable energy resources over the next 40 years, California must preserve access to a sufficient amount of those resources to enable competition among and between different renewable technology types, particularly as we begin to approach achievement of the goal in 2050.

Preserving the entire PWRA for potential wind development will avoid arbitrary restrictions on project development sites, avoid the creation of market power for land owners and developers, foster competition among wind energy developers and developers of other renewable energy technologies, and thus enable the state's renewable energy and greenhouse-gas-reduction goals to be met at least cost.

Conversely, if the DRECP removes portions of the PWRA (and likewise for other forms of renewable energy), each scenario should be analyzed for its impact on the market, as it can be expected that shrinking the available resource would eliminate promising renewable energy development areas, reduce competition, and thus raise renewable energy prices. Increased prices will, in turn, raise the cost of achieving California's clean energy goals and thus place achievement of those goals in jeopardy.

E. Provide for Further Study in Higher-Sensitivity and Longer-term Potential Development Areas

This wind scenario recognizes the fact that ACEC and DWMA areas, which contain a variety of unique concerns and associated management prescriptions, have not been studied for their compatibility

[15] See, e.g., Rick Miller, enXco, "Wind Siting Considerations & Project Development" (presentation to the DRECP Stakeholders' Committee). November 2011.

with wind energy developments. (Wind energy impacts were not considered in the development of BLM's Resource Management Plans for these areas.) Thus, by excluding these areas from the Wind-DFA, this scenario provides for any studies that may be necessary to understand any site-specific resource conflicts and impacts before a wind development is permitted.

Similarly, this scenario includes a phased approach that prioritizes the development of lands near existing transmission corridors to discourage the development of new transmission corridors and long generation interconnection lines.