



Imperial Irrigation District (IID) appreciates the opportunity to comment on the California Independent System Operator (CAISO) presentation during its 11/16/15 Stakeholder meeting discussing the 2015-2016 Transmission Plan. IID's comments are focused on the presentation entitled "Policy Driven Planning Deliverability Assessment Assumptions" and also on generation data shown under the 2015-2016 RPS Portfolio.

1. In the Policy Driven Planning presentation, third bullet, slide 4 "Import Assumptions" it states that IID imports through IID-SCE and IID-SDGE branch groups is increased from 2016 MIC. What is this new value of MIC for IID moving forward from 2016?
2. Further in this presentation it was mentioned that Imperial CREZ can accommodate up to 1750 MW of new generation. How is this 1750 MW determined? Can you provide a breakdown of where this generation is (or will be) located and how many MWs at each location?
3. IID's internal studies have indicated that Imperial CREZ can actually accommodate up to about 2800 MW depending upon where generation is located while respecting the ECO-Miguel constrained path. Did CAISO consider the Locational Effectiveness Factor (LEF) while determining the 1750 MW?
4. A formal presentation was made to CAISO senior management in March 2015 to share the above IID findings through ZGlobal. CAISO subsequently, performed an internal study to verify ZGlobal's findings and came up with a draft discussion paper recommending further analysis.
5. To follow up on IID internal study and ISO's own study, IID is recommending that IID and ISO staff work together to identify the most promising locations for new renewables in the Imperial Competitive Renewable Energy Zone (CREZ) to maximize the use of available transmission capacity in IID and CAISO systems to provide an overall benefit to California ratepayers. IID and CAISO studies are attached for reference.
6. A discussion paper focusing on the efficient use of existing transmission system to optimize renewable resources from the Imperial CREZ follows:



## **MAXIMIZING THE EFFICIENT USE OF EXISTING TRANSMISSION IN THE VALUATION OF IID EXPORT CAPABILITIES**

IID submits these comments through the CAISO 2015-2016 Transmission planning process. As stated before, IID believes that the current ISO Maximum Import Capability (“MIC”) is inconsistent with the physics of the grid, underutilizes existing transmission capacity, provides incentive to locate projects that have the highest adverse impact on the grid, and increases costs to both IID and CAISO/IOU’s ratepayers. These comments are focused on providing real examples to directly point out these inefficiencies. The objective is to work with the CAISO and the stakeholders to correct these inefficiencies and ensure fair and efficient use of the transmission system in both BAAs for the benefits of all California.

As California’s power system evolves in response to 33% -- now 50% -- renewable energy goals and beyond, it is important to incent new generation projects to make the best possible use of existing transmission facilities. The vehicle by which to satisfy this objective is to incorporate an explicit consideration of how to utilize existing transmission capacity in a flexible and efficient manner into renewable project valuation. This can be accomplished by taking into account: (1) the optimal utilization of existing transmission infrastructure; (2) an assignment of a proportional share of transmission costs to projects utilizing new transmission infrastructure regardless of the rationale for the new build; and (3) the allocation of project deliverability in a manner that incents proposed new generation projects to interconnect to facilities that will minimize their overall contribution to existing transmission constraints.

### **Background and Facts**

1. The IID's BAA accounts for 98 percent of the entire area in the Imperial CREZ.
2. Only 2 percent of the Imperial CREZ lies within the CAISO BAA.
3. Over 1,200 MW of wind and solar are under PPA with the IOUs that directly connect to the CAISO facilities in the Imperial CREZ.
4. However, only one solar project of 150 MW (one PPA) with SDGE has been constructed in the IID BAA and is currently delivering solar energy to SDGE customers.
5. IID has ample available transmission capacity to allow significant additional amounts of renewable generation to reach the CAISO BAA. The cost of this available capacity is the lowest in California at \$3/MWh.
6. As a result of the MIC currently assigned to IID, renewable energy projects in the Imperial CREZ are incentivized to obtain transmission service from CAISO, bypassing the IID system, despite the inefficiency of doing so.
7. There are two existing interties between CAISO’s system and IID’s system that provide the needed bridges between these two energy producing and energy consuming areas. These bridges also provide an efficient and effective pathway that can enable California to achieve a significant percentage of its renewable energy goals at a cost that is significantly lower than the cost associated with projects that would interconnect



directly into the CAISO.

8. IID submitted to CAISO in March 2015 an analysis demonstrating the generation locational impact in the three CEC designated Imperial CREZ regions (North, south and East). In addition, CAISO has acknowledged these locational impacts (both papers are attached for reference).

### **Inadequate Deliverability from IID into the CAISO**

In 2011, several stakeholders, including IID, CAISO and California Public Utilities Commission (CPUC) identified potential issues with the way in which the Maximum Import Capability (MIC) between the IID Balancing Authority Area (BAA) and the CAISO BAA was calculated. Recognizing the disadvantage that renewable energy projects interconnecting to IID's BAA faced, on July 7, 2011, the CPUC issued an Assigned Commissioner Ruling (ACR) by Commissioner Ferron that proposed to modify the CAISO's MIC process by developing a forward looking MIC calculation methodology, as opposed to relying solely on historical scheduled imports into the CAISO from IID. In that ACR, the MIC from the IID BAA to the CAISO was determined to be 1,400 MW, which is consistent with resource development projections in IID. The ACR specifically stated that it would be unreasonable for CPUC-jurisdictional load serving entities ("LSEs") to assume less than the 1,400 MW of MIC for procurement calculation purposes.

Since the issuance of its 2012 Transmission Planning Report (2011-2012 TPP), the CAISO has included a MIC value table showing the MIC from IID to CAISO for a ten-year planning horizon. Since then, this MIC value table has been used by LSE procurement staff in RFO bid evaluations for projects situated in the IID BAA, and in order to assign resource adequacy values to IID projects. Project lenders also use the MIC value table in their project evaluations. As such, the contents of this MIC value table are of paramount importance to projects situated in the IID, to LSE procurement staff, and to project lenders for successful completion of renewable projects in IID service territory.

In its 2013-2014 transmission plan, however, the CAISO indicated zero incremental deliverability for generators or projects connecting to the IID BAA, while projects that are within the Imperial CREZ or a few yards away, which can interconnect directly to the CAISO system, were deemed deliverable, and some of these were awarded PPAs<sup>1</sup>.

Other renewable energy projects that otherwise would have been located in and interconnected to the IID BAA were forced to construct gen-ties and connect to the CAISO BAA in order to obtain deliverability and be considered in the Independently Own Utilities (IOUs')

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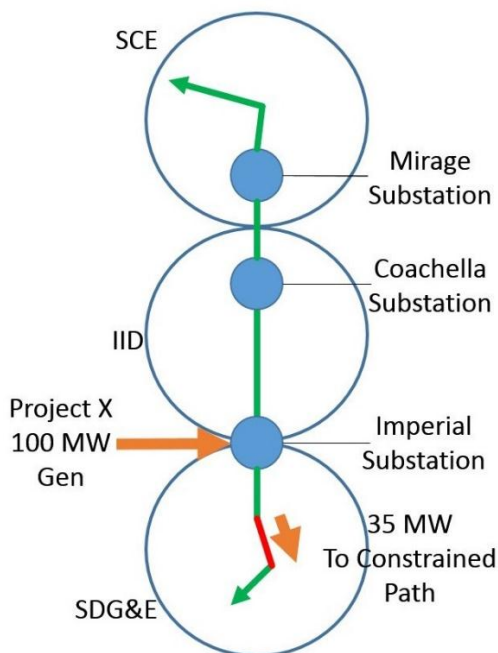
<sup>1</sup> <http://www.8minutenergy.com/news/press/srpcorp>



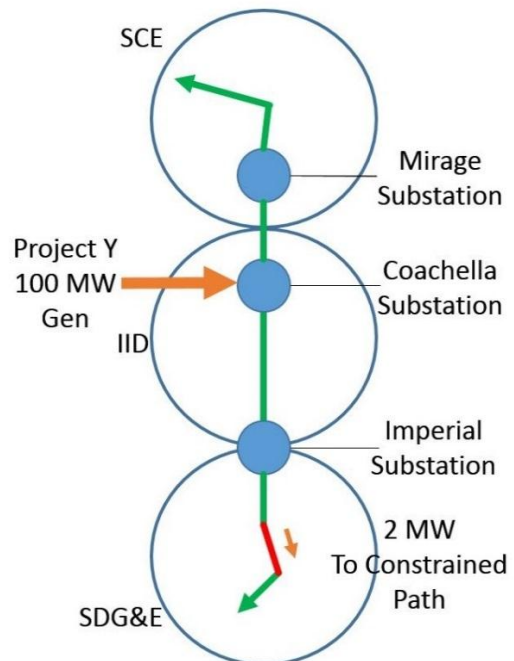
solicitations. The renewable energy projects built gen-ties in order to connect directly to the CAISO BAA, in some instances only a few hundred yards away from comparable project sites in the IID BAA, were awarded with Power Purchase Agreements (PPAs) totaling 1200 MW, whereas otherwise competitive projects that would interconnect to the IID BAA were awarded no PPAs at all.

To demonstrate the seriousness of this problem, consider two projects X and Y, both 100 MW and both projects bidding \$60/MWh and \$50/MWh respectively for renewable energy as a fully deliverable product. Both projects are located in the Imperial CREZ. Project X plans to connect to CAISO Imperial Valley substation as shown in Graphic 1: Project X.

Project Y plans to connect to IID’s Coachella Valley Substation as shown in Graphic 2: Project Y. Because of where the projects interconnect and the resultant energy flows toward the load center in San Diego, the congestion on the transmission corridor downstream leading to San Diego where the energy is consumed is worsened considerably by Project X (CAISO BAA interconnection), but only minimally by Project Y (IID BAA interconnection). By interconnecting to the CAISO’s Imperial Valley Substation, Project X contributes 35% of its energy output toward worsening congestion on the transmission corridor to San Diego. However, because Project Y is interconnected further north to IID’s Coachella Valley Substation, it contributes only 2% of its energy output to worsening congestion on the transmission corridor to San Diego.



**Graphic 1: Project X**



**Graphic 2: Project Y**

Everything else being equal, and assuming the IOU intends to purchase 100 MW, the current CAISO MIC “kills” project Y from even competing with project X based on the wrong



assumptions of no available MIC from IID. Even if Project Y is cheaper than Project X, the IOU's procurement will dis-qualify Project Y based on no MIC availability. In this instance, projects connecting to IID BAA always lose to projects a few miles away but connected to CAISO BAA. The irony is and in order for Project X to be fully deliverable, Project X uses 20 MW of IID transmission capacity that CAISO indicated is not available. Furthermore, Project X has the most adverse impact on the transmission grid and exasperates already heavily loaded lines.

This outcome will result in increasing congestion and subsequent higher energy and transmission costs to ratepayers and generators. There is a better solution. In order to maximize the use of the existing transmission system capacity and minimize the need for new transmission lines, the appropriate choice should have been to select Project Y for a full 100 MW (based on price, physically available transmission and effectiveness). This alternative outcome would ensure that projects that have the least overall impact on the existing transmission system (and the lowest overall transmission-related cost, along with other important attributes) should have an edge over projects that worsen congestion.

This example is not a hypothetical example, it's real and it's one of many examples that IID has directly experienced since 2012. This illustrates that the current method used by the CAISO to calculate and allocate the IID MIC and the total amount of deliverability from the Imperial CREZ is impacting the viability of projects connecting to IID BAA, inconsistent with the physics of the grid and actually increases congestion. For instance, most of the new generation awarded PPAs in the Imperial CREZ is clustered in one area near the CAISO BAA's Imperial Valley Substation. This location appears to be the worst possible location from a deliverability perspective, because it adversely affects congestion on the transmission corridor to San Diego. By comparison, projects that are located in the Coachella Valley area of the Imperial CREZ have much less impact on the congested transmission corridor than those interconnected to the CAISO's BAA near Imperial Valley Substation.

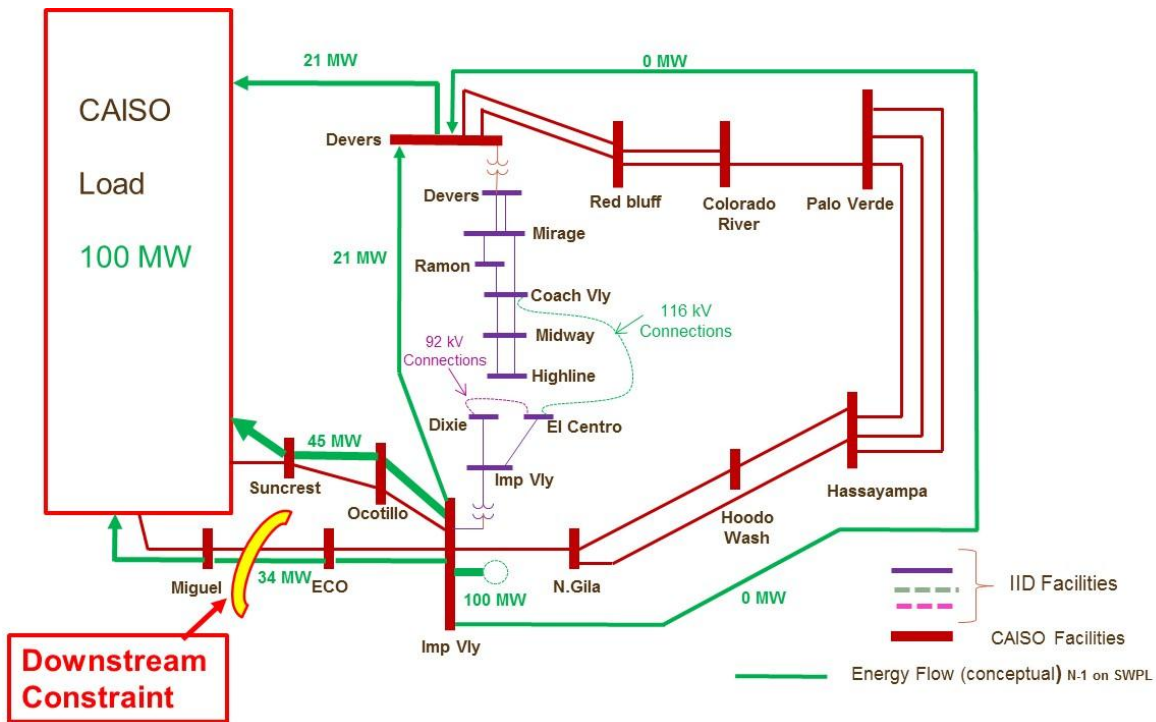
Recently, Southern California Edison ("SCE") procured over 406 MW<sup>2</sup> of solar connecting to the CAISO Imperial Valley Substation ("IVS"), in a location with one of the worst impacts on the constrained path. A power system analysis conducted by ZGlobal Inc. found that the location of generation within the Imperial CREZ<sup>3</sup> would have a disproportional impact on the grid, and, therefore, on the MIC from IID into the CAISO, as illustrated in Graphic 3 below.

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<sup>2</sup> <http://www.8minutenergy.com/news/press/srpcorp>

two 20-year power purchase agreements to sell 406 megawatts-ac of clean, renewable solar energy from Mount Signal Solar Farm II (154 MW-ac; 200 MW-dc) and Mount Signal Solar Farm V (252 MW-ac, 328 MW-dc) utility-scale solar projects in Imperial County, California, to Southern California Edison (SCE).

<sup>3</sup> Imperial CREZ consist of all of Imperial County and all of IID BAA.



**Graphic 3: Impact of 100 MW Generator Interconnected at Imperial Valley Substation on Downstream Constraint**

Interconnecting a 100 MW generator on the CAISO grid at the Imperial Valley Substation results in roughly 34 MW flowing through the downstream constraint into the San Diego load center. Much like trying to build a new on-ramp onto a congested freeway exacerbates traffic congestion, interconnecting a new generator upstream of a well-known transmission constraint exacerbates congestion on the transmission corridor. Locating a generator further north removed from the constraint, nearer Devers Substation in the northern part of IID’s BAA, considerably reduces the impact of new generation on the grid and, consequently, the need for additional transmission.

Table 1 below summarizes the disproportional impact of new generators on the constrained path.



Projects Approved and Online	IOU	Min MW	Technology	Vintage	Location	BAA	Impact on the Eco -Miguel 500kv Constrained path (%)	Impact on the Eco -Miguel 500kv Constrained path (MW)
<u>Kumevaay Wind</u>	SDG&E	51	Wind	New	San Diego County	CAISO	25%	12.75
<u>Ocotillo Express Wind Project</u>	SDG&E	265	Wind	New	Ocotillo, CA	CAISO/IVS	35%	92.75
<u>Campo Verde /Mt. Signal Solar</u>	SDG&E	49	Solar PV	New	Fillaree Ranch, Imperial Valley	CAISO/IVS	35%	17.15
<u>Imperial Solar Energy Center-South</u>	SDG&E	130	Solar PV	New	El Centro, CA, CA	CAISO/IVS	35%	45.5
<u>Centinela Solar (expansion)</u>	SDG&E	30	Solar PV	New	Callexico, CA	CAISO/IVS	35%	10.5
<u>Imperial Solar Energy Center-West</u>	SDG&E	130	Solar PV	New	El Centro, CA	CAISO/IVS	35%	45.5
Arlington Valley Solar Energy II	SDG&E	127	Solar PV	New	Arlington. AZ	CAISO	40%	50.8
<u>Mt. Signal Solar II</u>	SCE	154	Solar	New	Callexico, Imperial County, CA	CAISO/IVS	35%	53.732
<u>Mt. Signal Solar IV</u>	SCE	252	Solar	New	Callexico, Imperial County, CA	CAISO/IVS	35%	88.312
<b>Subtotal (1)</b>		<b>1188</b>					<b>35.1%</b>	<b>416.994</b>
<u>ORNI 18</u>	SCE	50	Geothermal	New	North Brawley, CA	IID	2%	1
<u>SG2 Imperial Valley</u>	SDG&E	150	Solar PV	New	Calapatria, CA	IID	15%	22.5
<u>Seville Tallbear LLC</u>	SDG&E	20	Solar PV	New	Calipatria, CA	IID	18%	3.6
<u>Calipatria</u>	SDG&E	20	Solar PV	New	Calipatria, CA	IID	15%	3
<u>Midway Solar Farm I</u>	PG&E	50	Solar PV	New	Calipatria, CA	IID	15%	7.5
<b>Subtotal (2)</b>		<b>290</b>					<b>13.0%</b>	<b>37.6</b>
<b>Total</b>		<b>1478</b>						<b>454.6</b>

On average, the CAISO-interconnected projects impact the constraint by 35% as opposed to 13% for IID-interconnected projects. That means for every 100 MW interconnected to the CAISO-grid, the active transmission constraint is worsened by 35 MW.

A second consequence of interconnecting generators to the CAISO grid is the impact on IID's BAA. Because electricity flows through the path of least resistance, interconnecting generation on one entity's electrical grid is not limited to flowing on that entity's grid. Electricity will flow on neighboring grids. To the extent that flow adversely impacts a neighbor's grid, neighbors notify the generators of the need to mitigate the impact.

In the case of generators interconnecting to the CAISO grid, IID is impacted in the form of reduced MIC. Graphic 3 above illustrates the impact of a 100 MW generator interconnected to Imperial Valley Substation on IID's grid in that roughly 21 MW flow through IID's BAA. Table 2 below summarizes the impact of CAISO-interconnected generators on MIC from IID's BAA.



Projects Approved and Online	IOU	Min MW	Technology	Vintage	Location	BAA	Impact on IID BAA MIC (%)	Impact on IID BAA MIC (MW)
<u>Kumeyaay Wind</u>	SDG&E	51	Wind	New	San Diego County	CAISO	15%	7.7
<u>Ocotillo Express Wind Project</u>	SDG&E	265	Wind	New	Ocotillo, CA	CAISO/IVS	18%	47.7
<u>Campo Verde /Mt. Signal Solar</u>	SDG&E	49	Solar PV	New	Fillaree Ranch, Imperial Valley	CAISO/IVS	20%	9.8
<u>Imperial Solar Energy Center-South</u>	SDG&E	130	Solar PV	New	8 mi SW of El Centro, CA, CA	CAISO/IVS	20%	26.0
<u>Centinela Solar (expansion)</u>	SDG&E	30	Solar PV	New	Calxico, CA	CAISO/IVS	20%	6.0
<u>Imperial Solar Energy Center-West</u>	SDG&E	130	Solar PV	New	8 mi SW of El Centro, CA	CAISO/IVS	20%	26.0
Arlington Valley Solar Energy II	SDG&E	127	Solar PV	New	AZ	CAISO	40%	50.8
<u>Mt. Signal Solar II</u>	SCE	154	Solar	New	Calxico, Imperial County, CA	CAISO/IVS	20%	30.7
<u>Mt. Signal Solar IV</u>	SCE	252	Solar	New	Calxico, Imperial County, CA	CAISO/IVS	20%	50.5
<b>Subtotal (1)</b>		<b>1188</b>					<b>21.5%</b>	<b>255.1</b>
<u>ORNI 18</u>	SCE	50	Geothermal	New	North Brawley, CA	IID	0%	0.0
<u>SG2 Imperial Valley</u>	SDG&E	150	Solar PV	New	Calapatria, CA	IID	0%	0.0
<u>Seville Tallbear LLC</u>	SDG&E	20	Solar PV	New	Calipatria	IID	0%	0.0
<u>Calipatria</u>	SDG&E	20	Solar PV	New	Calipatria	IID	0%	0.0
<u>Midway Solar Farm I</u>	PG&E	50	Solar PV	New	Calipatria, CA	IID	0%	0.0
Subtotal (2)		290						0.0
Total		1478						255.1

As a result of the 1,188 MW interconnected to the CAISO’s BAA near Imperial Valley Substation, MIC from IID’s BAA is reduced by roughly 255 MW. By incorporating the effect that new projects would have on existing transmission from adjacent BAAs, such as IID, would align the incentives to locate generation in a manner that is conducive to maximizing use of existing transmission infrastructure and, therefore, would maximize the transportation of renewable energy to load centers at the lowest possible cost. This step is critical to provide the appropriate indicator to facilitate the development of generation in locations that do not stress the grid and, thereby, assist the IOUs and other buyers in their procurement process.

Power system analysis results indicate that generation interconnected to IID’s Coachella Valley substation has only a 2% impact on the constrained path of the ECO-Miguel 500 kV line<sup>4</sup>. By contrast, a generator connected to the Imperial Valley 230 kV substation has a 35% impact on the same constrained path. The lower the impact that any generator has on a constrained path, the lower will be the cost to ratepayers.

The specific location of projects situated within the Imperial CREZ will have a significant impact on the amount of total CREZ generation that can be reliably delivered to load centers. Thus, the specific location of generation located within the Imperial CREZ will have a wide range of impacts on the total amount of generation that can be built in a world-class renewable energy resource area. Given California's aggressive renewable energy mandate, and the remarkably high quality of the resources in the Imperial CREZ, it is of the greatest importance to maximize the amount of high-quality renewable generation that the State can rely on from this area.

<sup>4</sup> A 100 MW injection at the Coachella Valley substation will result in 2 MW or 2% flow on the constrained path. The rest (98 MW or 98%) will flow on other non-constrained paths.





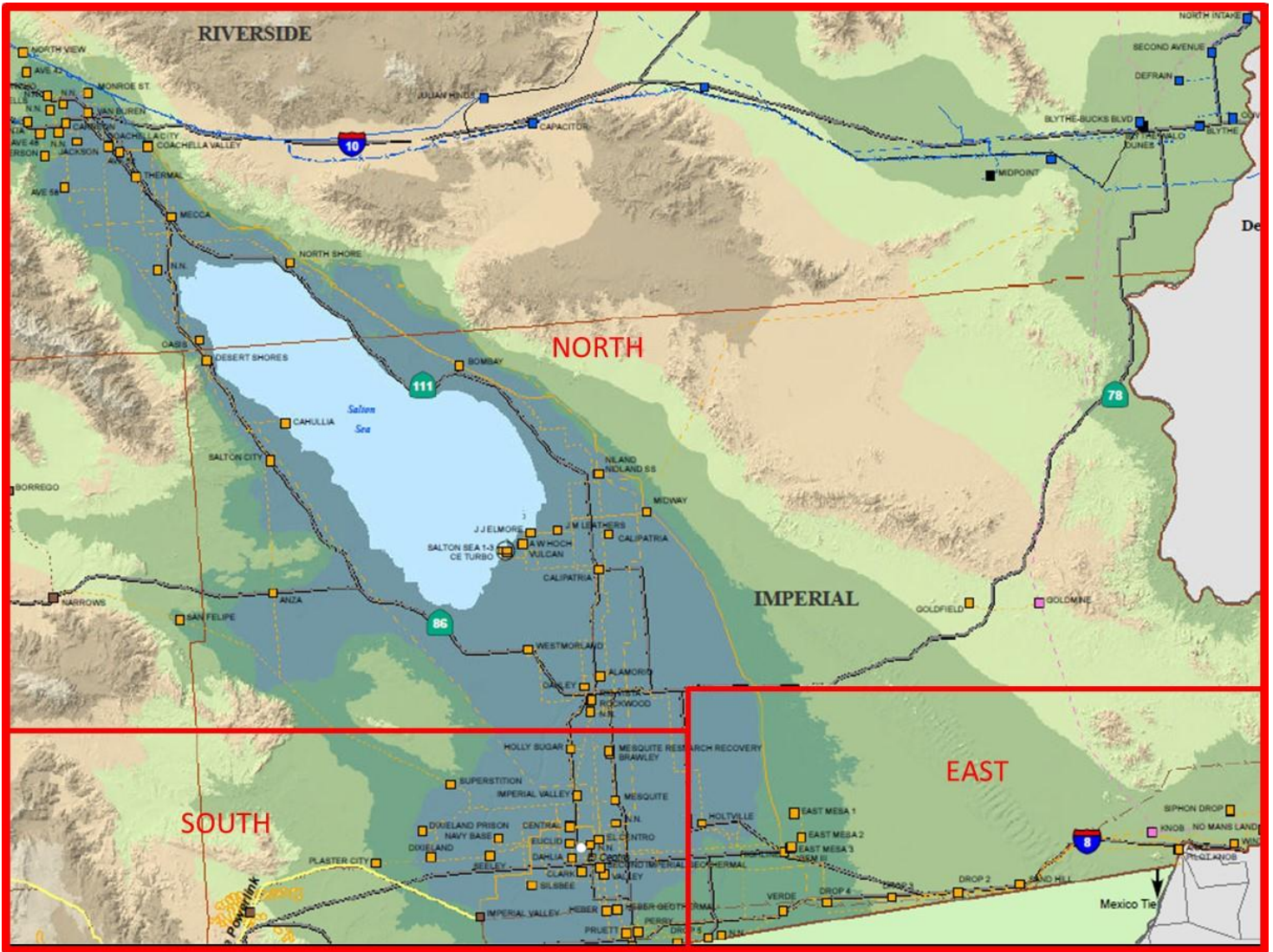
Specifically, the deliverability calculation for generation connected, respectively, to CAISO facilities and to the IID BAA should be modified based on the geographic location of a given generator and the actual behavior of the transmission system based on that geographic location (A geographical map of Imperial CREZ is shown below). This can be accomplished by adopting the Locational Effectiveness Factor (“LEF”) methodology. The CAISO recently adopted similar methods for the Los Angeles and San Diego basins<sup>5</sup>.

**The need to change:** Under the example discussed above, the LEF for a generator connected to the Coachella Valley (CV) substation is 98%. These results indicate that injecting 100 MW of generation at the CV substation will result in 2 MW of flow increase on the CAISO’s constrained path and 98 MW on its unconstrained paths. By contrast, for a generator interconnecting at the CAISO's Imperial Valley 230 kV substation, the LEF is. 65%, which indicates that a generator connecting to that substation will result in 35 MW of flow on the constrained path and 65 MW flow to unconstrained paths. The key point is that when more generation connects to buses with higher LEFs, there will be a higher degree of deliverability. In the specific case of interconnections of new generation within the IID BAA, this means that such interconnections will result in less congestion than new interconnections directly to the CAISO BAA within the Imperial CREZ. Hence, the CAISO's presumed MIC of 0 MW that is assigned to the IID BAA ignores both the actual impacts, as well as the basic physics, of interconnections within the Imperial CREZ and must be revised upward by a very significant amount. As a first step in this necessary correction, the CAISO should utilize the LEF to inform its stakeholders regarding the impacts of the procurement and the interconnection of new generation in both IID and CAISO BAAs.

The current ISO policy of ignoring the generation locations impact is costing California ratepayers millions of dollars. Since an overwhelming amount of renewable generation from the Imperial CREZ has been procured on behalf of the IOU’s and since CAISO have implemented similar method for IOUs procurement in San Diego and Los Angeles areas under the CPUC in D.13-02-015, why not implement the same method for the three regions within Imperial CREZ ?

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<sup>5</sup>[http://www.CAISO.com/Documents/LocationalEffectivenessFactors-LA-Basin\\_2013-2014.pdf](http://www.CAISO.com/Documents/LocationalEffectivenessFactors-LA-Basin_2013-2014.pdf);  
[http://www.CAISO.com/Documents/LocationalEffectivenessFactors-SanDiego\\_2013-2014.pdf](http://www.CAISO.com/Documents/LocationalEffectivenessFactors-SanDiego_2013-2014.pdf)



Graphic 4: Geographic map of Imperial CREZ