

Executive Summary

The retirement of the San Onofre Nuclear Generating Station (SONGS), along with the Once through Cooling (OTC) generation in the Los Angeles and San Diego load centers provides an opportunity to replace some of the lost generation with cost effective, highly efficient, renewable generation (Geothermal, Solar, Wind and Biomass) from Imperial Valley, California. The Imperial Valley is very rich in renewable resources. The Desert Renewable Energy Conservation Plan (“DRECP”) estimates the renewable potential at a minimum of approximately 10,000 MW¹. The proposed STEP is a reliability and policy driven project that would provide significant reliability and economic benefits to all ratepayers. In addition, it provides an effective multi-regional solution that would strengthen the grid in Southern California and reduce the impact of several existing CAISO transmission contingencies associated with the loss of major transmission lines, like the Sunrise Power Link, the Southwest Power Link, Palo Verde – Devers 500 kV line, Colorado River – Devers 500 kV line, the west of Devers corridors and the south of Lugo pathways.

STEP Phase I:

A 2200 MW IID Collector System: IID proposes to finance, construct and upgrade its internal transmission network, creating an internal Collector System that would facilitate the export of 1100 MW to the CAISO and simultaneously another 1100 MW to the Southwest² of geothermal and solar energy.

The STEP proposal vastly improves the reliability of the grid by:

1. Providing a parallel path to the constrained North Gila – Imperial Valley 500 kV line, this was the source of the September 8, 2011 outage.
2. Significantly improves the voltage support in southern Orange County and northern San Diego County by providing, through the DC line, a +/- 750 MVAR reactive support and system inertia from the Voltage Source Converter (“VSC”). Provides a second path of energy into the SDG&E service area independent of the Sunrise Power Link and the South West Power Link.
3. By removing existing transmission constraints the import capability into SDG&E will increase leading to increased utilization of the existing Sunrise Power Link and South West Power Link 500 kV transmission lines.
4. Provides a new and direct-connect renewable energy generation pathway to both SCE and SDG&E load centers.
5. Provides system stability to SONGS area using the proven technology of the Voltage Source Converter (“VSC”).
6. Utilizes the DC line as an effective tool to integrate renewable and provide local grid stability.
7. Improves the IID connection to SDG&E /CAISO at the Imperial Valley substation from a single 230 kV line rated at 600 MW to double circuit 230 kV line rated at 1,600 MW.
8. Strengthen the interconnection between the southwest region, Mexico and California

[://www.drecp.org/documents/docs/2012-12-21_DRECP_Alternatives_Primary_Features.pdf](http://www.drecp.org/documents/docs/2012-12-21_DRECP_Alternatives_Primary_Features.pdf)

² Export to the southwest can exceed 1100 MW in phase I

9. Eliminates most, if not all, reliability issues³ on the CAISO Grid and defer or eliminates major upgrades resulting from SONGS and OTC retirements.

Summary of Reliability and Economic Analysis

1. The total cost of the STEP proposal is estimated at approximately \$2 Billion (the DC line and the IID Collector System costs are estimated at \$1.5 Billion and \$508 Million respectively).
2. Under the base scenario, assuming 1,100 MW of DC line capacity into the CAISO will displace 550 MW of local photovoltaic (PV) capacity and 550 MW of combustion turbines (CT) both located in the Los Angeles (LA) Basin, the STEP project results in significant savings to CAISO ratepayers as follows:
 - The Levelized cost (including the cost of the IID Collector System is \$255 Million⁴ versus the levelized benefit of \$452 Million. (See Section IV for full explanation.) This results in a benefit to cost ratio of 1.77.
 - The levelized benefits, per year, of \$452 Million are further broken down to the following Benefit categories:
 - ✓ Expected consumer benefit (reduction in energy cost) of \$66.9 Million.
 - ✓ RPS Savings (reduction in cost to meet the RPS goal of \$312 Million.
 - ✓ Generation Capacity cost savings of \$70 Million.
 - ✓ Insurance value against a low probability high impact outage that result in benefits of \$0.63 Million, and
 - ✓ Reduction in transmission losses of \$1.4 Million due to increased efficiency.
 - Another way to evaluate the benefits, in addition to the levelized benefits, is to calculate the total benefits over the life of the projects, and calculate the present value for each benefit category. The following table summarizes the economic and reliability benefit under the base scenario:

Summary of Project Benefits	Project Cost (\$M)	Total Benefit (\$M)	Benefit/Cost Ratio
Prevent Value (\$2017)	\$3,031	\$6,479	2.14
Levelized (Nominal) \$M per year	\$255	\$452	1.77
Total Cost	\$7,669	\$18,072	2.36

3. A sensitivity case (referred to as the all renewable case) was performed to quantify the economic and reliability benefits under a scenario where all of the 1,100 MW of DC line into CAISO was displaced and 1100 MW of local PV capacity was located in the LA Basin. Under this scenario, the STEP project results in even more significant savings to CAISO ratepayers.

³ Currently, one of the most binding constraints that limit the imports of power into SDGE and portion of SCE is the loss of North Gila – 500 kV Line. The STEP proposal eliminates this binding constraint,

⁴ This is a very conservative assumptions since we included all of IID Collector System rated at 2200 MW in the cost benefit analysis to CAISO ratepayers

- The levelized cost (including IID Collector System is \$255 Million⁵ versus the levelized benefit of \$693 Million. The result is a benefit to cost ratio of 2.72.
- Another way to evaluate the benefits, in addition to the levelized benefits is to calculate the total benefits over the life of the project, and the present value for each benefit category. The table below summarizes the economic and reliability benefit under the all renewable scenario:

Summary of Project Benefits	Project Cost (\$M)	Total Benefit (\$M)	Benefit/Cost Ratio
Prevent Value (\$2017)	\$3,031	\$9,944.27	3.28
Levelized (Nominal) \$M per year	\$255	\$693	2.72
Total Cost	\$7,669	\$27,734	3.62

4. From a total cost perspective under the base scenario, it is estimated that STEP saves California ratepayers \$3.4 Billion in 2017 dollars versus the alternative scenario of 550 MW of CT and 550 MW of local PV in the load centers.
 - SCE and SDG&E have proposed several transmission projects that are needed due to the retirement of SONGS. These proposed transmission upgrades internal to SCE and SDG&E systems are estimated to cost \$1 Billion. Analysis shows that the STEP proposal eliminates the proposed SCE & SDG&E transmission projects (see Section 3.3). Under all scenarios, the analysis does not include the benefit realized from eliminating the expenses from SCE/SDG&E transmission proposed projects listed in section 3.3 that would otherwise be needed if the STEP is not implemented⁶.

Cost Allocation

The proposed IID Collector System is necessary to transmit power from generators throughout the IID territory under a point-to-point transmission service agreement in either direction (southeast to Arizona or west and north to SCE/SDG&E /PG&E load centers).

IID will construct, own, operate and finance the IID Collector System. IID is proposing to allocate the cost of the IID Collector System to the off-takers of the renewable energy. This proposal, if implemented, would eliminate the IID transmission wheeling fees; allocate transmission costs to the users of the transmission lines, not the generators⁷ and would ensure that the costs of the IID Collector System and associated upgrades are pre-determined and fixed throughout the transmission service agreement. Under this proposal, the transmission cost and associated maintenance costs would be known and fixed.

⁵ This is a very conservative assumptions since we included all of IID Collector System rated at 2200 MW in the cost benefit analysis to CAISO ratepayers

⁶ http://www.aiso.com/Documents/Presentation-PreliminaryReliabilityAssessmentResults-Sep25_2013.pdf
http://www.aiso.com/Documents/Presentation-PreliminaryReliabilityAssessmentResults-Sep26_2013.pdf

⁷ Users of the transmission system can be IID, SCE, and SDG&E, Arizona utilities or any entity that request transmission service from IID