BEACON SOLAR ENERGY PROJECT

APPLICATION FOR CERTIFICATION

Volume 1

by:

Beacon Solar, LLC

Submitted to:
California Energy Commission

Prepared by:
ENSR

March 2008

Volume 1 Contents

1.0 Executive Summary 1-1

1.1 Project Overview 1-1

1.2 Project Location and Description 1-2

1.3 Project Alternatives 1-3

1.4 Environmental Information 1-5

1.4.1 Air Quality 1-5
1.4.2 Biological Resources 1-5
1.4.3 Cultural Resources 1-6
1.4.4 Geologic Resources and Hazards 1-6
1.4.5 Hazardous Materials Handling 1-7
1.4.6 Land Use 1-7
1.4.7 Noise 1-8
1.4.8 Paleontological Resources 1-8
1.4.9 Public Health 1-8
1.4.10 Socioeconomics 1-8
1.4.11 Soils 1-9
1.4.12 Traffic and Transportation 1-9
1.4.13 Transmission System Safety and Nuisance 1-9
1.4.14 Visual Resources 1-9
1.4.15 Waste Management 1-10
1.4.16 Water Resources 1-10
1.4.17 Worker Safety 1-11

2.0 Project Description 2-1

2.0 Project Description 2-1

2.1 Introduction and Overview 2-1

2.2 Project Objectives 2-2

2.3 Location of Facilities 2-3

2.4 Site Description 2-3

2.4.1 Existing Site Conditions 2-3
2.4.2 Site Surveys and Engineering Design Criteria 2-4

2.5 Generating Facility Description 2-4
2.5.1 Site Arrangement 2-4
2.5.2 Process Description 2-5
2.5.3 Energy Conversion Facilities Description 2-7
2.5.4 Electrical System Description 2-10
2.5.5 Plant Auxiliary Systems 2-13
2.5.6 Project Civil/Structural Features 2-23
2.5.7 Construction of Generating Facilities 2-26
2.5.8 Project Operation 2-27

2.6 Natural Gas Pipeline 2-27
2.6.1 Pipeline Description 2-27
2.6.2 Pipeline Construction 2-28

2.7 Transmission System 2-29
2.7.1 Transmission System Description 2-29
2.7.2 Construction of Transmission Facilities 2-31
2.7.3 Interconnection Study 2-32
2.7.4 Existing SCE Distribution Line 2-32

3.0 Closure

3.1 Temporary Closure 3-1

3.2 Permanent Closure 3-2

4.0 Project Alternatives 4-1

4.1 CEQA Requirements 4-1

4.2 Alternatives Screening Methodology 4-1
4.2.1 Project Objectives 4-2
4.2.2 Potential Significant Impacts 4-2
4.2.3 Site Feasibility Criteria Defined 4-3

4.3 No Project Alternative 4-4

4.4 Project Site and Linear Alternatives 4-4
4.4.1 Alternative Site Selection Criteria 4-4
4.4.2 Project Site Alternatives 4-5
4.4.3 Transmission Route Alternatives 4-7
4.4.4 Gas Pipeline Alternatives 4-7

4.5 Power Generation Facility Design Alternatives 4-8
4.5.1 Project Size 4-8
4.5.2 Cooling Technology Alternatives 4-8
4.5.3 Cooling Water Supply Alternatives 4-15
4.5.4 Cooling Tower Blowdown Disposal Alternatives 4-16
4.5.5 Solar Thermal Storage 4-19

4.6 Power Generation Technology Alternatives 4-19
4.6.1 Alternative Solar Technologies 4-20
4.6.2 Other Renewable Technologies 4-21
4.6.3 Non-Renewable Technologies 4-21

4.7 References 4-21

5.0 Environmental Information 5.1-1

5.1 General 5.1-1
5.1.1 Projects Considered in Cumulative Impact Analysis 5.1-2
5.1.2 References 5.1-4

5.2 Air Quality 5.2-1
5.2.1 LORS Compliance 5.2-1
5.2.2 Affected Environment 5.2-13
5.2.3 Control Technology Assessment 5.2-23
5.2.4 Environmental Impacts 5.2-29
5.2.5 Mitigation Measures 5.2-44
5.2.6 References 5.2-48

5.3 Biological Resources 5.3-1
5.3.1 LORS Compliance 5.3-1
5.3.2 Affected Environment 5.3-6
5.3.3 Environmental Impacts 5.3-23
5.3.4 Mitigation Measures 5.3-36
5.3.5 References 5.3-43

5.4 Cultural Resources 5.4-1
5.4.1 LORS Compliance 5.4-1
5.4.2 Affected Environment 5.4-6
5.4.3 Environmental Impacts 5.4-15
5.4.4 Mitigation Measures 5.4-24
5.4.5 References 5.4-25

5.5 Geologic Hazards and Resources 5.5-1
5.5.1 LORS Compliance 5.5-1
5.5.2 Affected Environment 5.5-3
5.5.3 Environmental Impacts 5.5-10
5.5.4 Mitigation Measures 5.5-12
5.5.5 References 5.5-12

5.6 Hazardous Material Handling 5.6-1
5.6.1 LORS Compliance 5.6-1
5.6.2 Affected Environment 5.6-9
5.6.3 Environmental Impacts 5.6-10
5.6.4 Mitigation Measures 5.6-23
5.6.5 References 5.6-26

5.7 Land Use 5.7-1
5.7.1 LORS Compliance 5.7-1
5.7.2 Affected Environment 5.7-9
5.7.3 Environmental Impacts 5.7-10
5.7.4 Mitigation Measures 5.7-12
5.7.5 References 5.7-13

5.8 Noise 5.8-1
5.8.1 LORS Compliance 5.8-1
5.8.2 Affected Environment 5.8-3
5.8.3 Environmental Impacts 5.8-7
5.8.4 Mitigation Measures 5.8-15
5.8.5 References 5.8-15

5.9 Paleontological Resources 5.9-1
5.9.1 LORS Compliance 5.9-1
5.9.2 Affected Environment 5.9-3
5.9.3 Environmental Impacts 5.9-7
5.9.4 Mitigation Measures 5.9-8
5.9.5 References 5.9-10

5.10 Public Health 5.10-1
5.10.1 LORS Compliance 5.10-1
5.10.2 Affected Environment 5.10-5
5.10.3 Environmental Impacts (Health Risk Assessment) 5.10-6
5.10.4 Mitigation Measures 5.10-16
5.10.5 References 5.10-17

5.11 Socioeconomics 5.11-1
5.11.1 LORS Compliance 5.11-1
5.11.2 Affected Environment 5.11-3
5.11.3 Environmental Impacts 5.11-13
5.11.4 Mitigation Measures 5.11-31
5.11.5 References 5.11-31

5.12 Soils 5.12-1
5.12.1 LORS Compliance 5.12-1
5.12.2 Affected Environment 5.12-3
5.12.3 Environmental Impacts 5.12-6
5.12.4 Mitigation Measures 5.12-9
5.12.5 References 5.12-9

5.13 Traffic and Transportation 5.13-1
5.13.1 LORS Compliance 5.13-1
5.13.2 Affected Environment 5.13-5
5.13.3 Environmental Impacts 5.13-10
5.13.4 Mitigation Measures 5.13-18
5.13.5 References 5.13-19

5.14 Transmission Line Safety and Nuisance 5.14-1
5.14.1 LORS Compliance 5.14-1
5.14.2 Affected Environment 5.14-6
5.14.3 Impacts 5.14-6
5.14.4 Mitigation Measures 5.14-11

5.15 Visual Resources 5.15-1
5.15.1 LORS Compliance 5.15-1
5.15.2 Affected Environment 5.15-3
5.15.3 Environmental Impacts 5.15-8
5.15.4 Mitigation Measures 5.15-16
5.15.5 References 5.15-16

5.16 Waste Management 5.16-1
5.16.1 LORS Compliance 5.16-1
5.16.2 Affected Environment 5.16-8
5.16.3 Environmental Impacts 5.16-10
5.16.4 Mitigation Measures 5.16-16
5.16.5 References 5.16-18

5.17 Water Resources 5.17-1
5.17.1 LORS Compliance 5.17-1
5.17.2 Affected Environment 5.17-10
5.17.3 Environmental Impacts 5.17-25
5.17.4 Mitigation Measures 5.17-36
5.17.5 References 5.17-37

5.18 Worker Safety 5.18-1
5.18.1 LORS Compliance 5.18-1
5.18.2 Affected Environment 5.18-9
5.18.3 Environmental Impacts 5.18-9
5.18.4 Mitigation Measures 5.18-22
5.18.5 References 5.18-22

6.0 List of Contributors 6-1

List of Appendices

Appendix A Surrounding Properties: Assessor's Parcel Nos./Property Owners

Appendix B Geotechnical Reports
B.1 Preliminary Geotechnical Constraints Evaluation
B.2 Preliminary Geotechnical Investigation Report

Appendix C Engineering Design Criteria
C.1 Civil Engineering Design Criteria
C.2 Mechanical Engineering Design Criteria
C.3 Control Engineering Design Criteria
C.4 Geologic and Foundation Design Criteria
C.5 Structural Engineering Design Criteria
C.6 Electrical Engineering Design Criteria

Appendix D Therminol™ VP1 Heat Transfer Fluid: Material Safety Data Sheet

Appendix E Air Quality Supporting Documentation
E.1 Quarterly Wind Roses
E.2 Construction and Operations Phase Emissions
E.3 Class II Area Dispersion Modeling Protocol
E.4 AQ Modeling Files (Separate CD-ROM)

Volume 2 Contents

Appendix F Biological Resources Supporting Documentation

F.1 Beacon Solar Energy Project Biological Technical Report

F.2 Correspondence with Federal and California State Agencies Regarding Beacon Solar Energy Project

Appendix G Cultural Resources Technical Report

G.1 Archeological Report

G.2 Built Resources

Appendix H Paleontological Resources Technical Report

Appendix I Phase 1 Environmental Site Assessments

I.1 2007 Environmental Site Assessment, Fremont Valley Ranch

1.2 2008 Environmental Site Assessment, Additional 80 Acres

1.3 2008 Environmental Site Assessment, Additional 14 Acres

Appendix J Water Resources Supporting Documentation

J.1a Well and Groundwater Level Database - Koehn Sub-basin

J.1b Plant Site Details

J.2 Groundwater Model - Koehn Sub-basin

J.3 Aquifer Testing Program - Procedures and Results Wells Nos 43, 48 and 63

J.4 Geochemical Database - Koehn Sub-basin

Appendix K Agency Correspondence

K.1 Water Agencies

K.2 Los Angeles Department of Water and Power

K.3 Southern California Gas Company

K.4 Kern County Agencies

K.5 Department of Defense Agencies

K.6 Department of Toxic Substances and Control

Appendix L Drainage Plans

L.1 Conceptual Drainage Plan

L.2 Drainage, Erosion, and Sediment Control Plan

List of Tables

2.0 Project Description

Table 2-1 Summary Legal Description 2-3
Table 2-2 Typical Natural Gas Composition 2-14
Table 2-3 Water Use 2-15
Table 2-4 Typical Water Quality Data in the Project Area 2-16

4.0 Project Alternatives

Table 4-1 Alternative Sites Considered 4-5
Table 4-2 Alternative Sites Dropped from Further Analysis 4-6
Table 4-3 Annual Generation Impact and Net Present Value for Wet and Dry Cooling 4-11
Table 4-4 Annual Water Make-Up for Wet and Dry Cooling 4-12
Table 4-5 Hybrid Cooling: Share of Heat Duty Load for Wet and Dry Cooling Systems (Percentage) 4-13
Table 4-6 Annual Generation Impact and Net Present Value for Wet and Hybrid Cooling 4-14
Table 4-7 Annual Water Make-Up for Wet and Hybrid Cooling 4-15
Table 4-8 Water Supply Alternatives Considered 4-17
Table 4-9 Estimated Capital and O&M Costs for Evaporation Ponds and ZLD Water Treatment Systems 4-19

5.2 Air Quality

Table 5.2-1 Federal, State and Local LORS Applicable to Air Quality 5.2-2
Table 5.2-2 Agencies and Agency Contacts 5.2-12
Table 5.2-3 Permits Required and Permit Schedule 5.2-13
Table 5.2-4 Climatic Temperature Data for Mojave, California 5.2-15
Table 5.2-5 Climatic Precipitation Data for Mojave, California 5.2-16
Table 5.2-6 National and California Ambient Air Quality Standards 5.2-17
Table 5.2-7 Summary of Attainment Status of the Project Area 5.2-19
Table 5.2-8 Air Quality Monitoring Stations Closest to the Project Site 5.2-19
Table 5.2-9 Ozone Data for Stations Nearest to the Project Site 5.2-20
Table 5.2-10 PM10 Data for Stations Nearest to the Project Site 5.2-20
Table 5.2-11 PM2.5 Data for Stations Nearest to the Project Site 5.2-21
Table 5.2-12 NO_2 Data for Stations Nearest to the Project Site 5.2-21
Table 5.2-13 CO Data for Stations Nearest to the Project Site 5.2-22
Table 5.2-14 SO_2 Data for Stations Nearest to the Project Site 5.2-22
Table 5.2-15 Proposed BACT for the Boilers 5.2-25
Table 5.2-16 Proposed BACT for the Fire Pump Engine 5.2-27
Table 5.2-17 Maximum Onsite Solar Facility Construction Emissions 5.2-30
Table 5.2-18 Maximum Daily Offsite Construction Emissions 5.2-30
Table 5.2-19 Boiler Criteria Pollutant Emissions (One Boiler) 5.2-31
Table 5.2-20 Fire Pump Engine Criteria Pollutant Emissions 5.2-32

Table 5.2-21 Cooling Tower PM10 Emissions 5.2-32
Table 5.2-22 HTF VOC Emissions 5.2-33
Table 5.2-23 Maintenance Vehicle Emissions 5.2-34
Table 5.2-24 Summary of Project Criteria Pollutant Emissions 5.2-36
Table 5.2-25 Summary of Project GHG Emissions 5.2-36
Table 5.2-26 Emissions Data for Construction Impacts Modeling 5.2-38
Table 5.2-27 NAAQS and CAAQS Analysis for Project Construction 5.2-40
Table 5.2-28 Stack Parameters for the Ancillary Equipment 5.2-41
Table 5.2-29 Summary of GEP Analysis 5.2-42
Table 5.2-30 Maximum Modeled Concentrations for Project Normal Operations 5.2-42
Table 5.2-31 NAAQS and CAAQS Analysis for Project Normal Operations 5.2-43

5.3 Biological Resource

Table 5.3-1 LORS Applicable to Biological Resources 5.3-1
Table 5.3-2 Agencies and Agency Contacts 5.3-5
Table 5.3-3 Required Biological Resource Permits and Permitting Schedule 5.3-6
Table 5.3-4 Vegetation Communities and Cover Types 5.3-13
Table 5.3-5 Potentially Occurring Special Status Plant Species Relevant to the Beacon Solar Energy Project 5.3-16
Table 5.3-6 Potentially Occurring Special Status Wildlife Species Relevant to the BSEP 5.3-18
Table 5.3-7 Estimated Desert Tortoise and Mojave Ground Squirrel Potential Habitat Acreage West of SR-14-Potentially Impacted by Transmission Line Route Options 1 and 2 ..... 5.3-25
Table 5.3-8 Anticipated Permanent and Temporary Impacts to Plant Communities 5.3-26
Table 5.3-9 Waste Constituent Concentrations at Points within the Process and Discharge to the Evaporation Ponds 5.3-33
Table 5.3-10 Anticipated Mitigation for Impacts to Potential Habitat for Special Status Wildlife Species 5.3-38

5.4 Cultural Resources

Table 5.4-1 LORS Applicable to Cultural Resources 5.4-1
Table 5.4-2 Agency Contacts 5.4-5
Table 5.4-3 Summary of Previous Surveys within Records Search Limits 5.4-11
Table 5.4-4 Summary of Previously Recorded Cultural Resources 5.4-13
Table 5.4-5 Consulting Parties and Public Participation Contacts by Affiliation 5.4-15
Table 5.4-6 Summary of Beacon Solar Energy Project Site Data and Impact Assessment 5.4-17

5.5 Geologic Hazards and Resources

Table 5.5-1 LORS Applicable to Geological Resources and Hazards 5.5-1
Table 5.5-2 Agencies and Agency Contacts 5.5-2
Table 5.5-3 Permits Required and Permit Schedule 5.5-3
Table 5.5-4 Active and Potentially Active Faults with Peak Site greater than 0.1 g 5.5-6

5.6 Hazardous Material Handling

Table 5.6-1 Summary of Applicable Hazardous Materials LORS 5.6-1
Table 5.6-2 Agencies and Agency Contacts 5.6-8
Table 5.6-3 Summary of Special Handling Precautions for Large Quantity Hazardous Materials 5.6-12

5.7 Land Use

Table 5.7-1 LORS Applicable to Land Use 5.7-2
Table 5.7-2 Project Area General Plan Land Use Designations 5.7-4
Table 5.7-3 Zoning Designations Within and Near BSEP Plant Site 5.7-7
Table 5.7-4 Agency Contact List 5.7-8
Table 5.7-5 Land Use Related Permits Required and Schedule 5.7-9

5.8 Noise

Table 5.8-1 LORS Applicable to Noise 5.8-1
Table 5.8-2 Agencies and Agency Contacts 5.8-3
Table 5.8-3 Definition of Technical Terms Related to Noise 5.8-5
Table 5.8-4 Long-Term Ambient Noise Measurements (dB(A))– 12/03/07-to 12/04/07 ..... 5.8-8
Table 5.8-5 Short-Term Ambient Noise Measurements – 12/05/07 ..... 5.8-9
Table 5.8-6 Construction Equipment Noise Emissions 5.8-9
Table 5.8-7 BSEP Equipment Noise Emissions 5.8-11
Table 5.8-8 BSEP Equipment Noise Emissions 5.8-13

5.9 Paleontological Resources

Table 5.9-1 Summary of LORS for Paleontological Resources 5.9-1
Table 5.9-2 Agencies and Agency Contacts 5.9-3
Table 5.9-3 Geologic Units Underlying the BSEP and their Paleontological Sensitivity Ratings 5.9-5

5.10 Public Health

Table 5.10-1 Summary of LORS Applicable to Public Health 5.10-2
Table 5.10-2 Administering Agency and Contact Information 5.10-5
Table 5.10-3 Chemical Substances Potentially Emitted from the BSEP 5.10-7
Table 5.10-4 Risk Assessment Health Values for Substances of Potential Concern 5.10-10
Table 5.10-5 Toxic Air Contaminant Emissions for Auxiliary Boilers 5.10-11
Table 5.10-6 Toxic Air Contaminant Emissions for Emergency Internal Combustion Engine 5.10-12
Table 5.10-7 Toxic Air Contaminant Emissions for Cooling Tower 5.10-12
Table 5.10-8 Toxic Air Contaminant Emissions for Ullage Vent and Waste Loadout 5.10-12
Table 5.10-9 Toxic Air Contaminant Prioritization Scores 5.10-14

5.11 Socioeconomics

Table 5.11-1 LORS Applicable to Socioeconomics 5.11-1
Table 5.11-2 Population Estimates and Projection 5.11-4
Table 5.11-3 Average Annual Population Growth Rates 5.11-5
Table 5.11-4 2006-Employment by Industry for Kern, Los Angeles, and San Bernardino Counties 5.11-7
Table 5.11-5 Employment by Industry (Year 2000 Annual Average) 5.11-9
Table 5.11-6 Hospitals Serving the Project Area 5.11-11
Table 5.11-7 Summary of Schools and Enrollment in Mojave School District 5.11-12
Table 5.11-8 Kern County Expenses and Revenues for FY 2007-2008 ..... 5.11-13
Table 5.11-9 BSEP Construction Workforce by Skill 5.11-15
Table 5.11-10 Available Labor: Bakersfield Metropolitan Statistical Area (Kern County) 5.11-17
Table 5.11-11 Available Labor: Long Beach Metropolitan Statistical Area (Los Angeles County) 5.11-19
Table 5.11-12 Available Labor: Ontario Metropolitan Statistical Area (San Bernardino/Riverside County) 5.11-21
Table 5.11-13 Available Construction Labor by Skill 5.11-23
Table 5.11-14 Environmental Justice Characteristics 5.11-30

5.12 Soils

Table 5.12-1 LORS Applicable to Soils 5.12-1
Table 5.12-2 Agencies and Agency Contacts 5.12-3

5.13 Traffic and Transportation

Table 5.13-1 LORS Applicable to Traffic and Transportation 5.13-1
Table 5.13-2 Agencies and Agency Contacts 5.13-4
Table 5.13-3 Required and Permit Schedule 5.13-5
Table 5.13-4 Level of Service Description for Roadway Sections 5.13-7
Table 5.13-5 Baseline Peak Hour Roadway Traffic Volumes, Design Capacities, and Levels of Service (Without the Project) 5.13-7
Table 5.13-6 Peak Hour Roadway Traffic Volumes, Design Capacities, and Levels of Service (With Project Related Traffic) 5.13-12

5.14 Transmission Line Safety and Nuisance

Table 5.14-1 Transmission System Design and Construction LORS 5.14-1
Table 5.14-2 Transmission System Aviation Safety LORS 5.14-3
Table 5.14-3 Transmission System Radio Frequency Communication LORS 5.14-3
Table 5.14-4 Transmission System Audible Noise LORS 5.14-4
Table 5.14-5 Transmission System Hazardous and Nuisance Shocks LORS 5.14-4
Table 5.14-6 Transmission System Electric and Magnetic Fields LORS 5.14-5
Table 5.14-7 Transmission System Fire Hazards LORS 5.14-5
Table 5.14-8 EMF Study Conductor Information 5.14-10
Table 5.14-9 EMF Study Edge-of-ROW Calculation Results 5.14-10

5.15 Visual Resources

Table 5.15-1 Summary of Applicable Visual Resources LORS 5.15-1
Table 5.15-2 Agencies and Agency Contacts 5.15-3
Table 5.15-3 Equipment Dimensions 5.15-9
Table 5.15-4 Cooling Tower Daytime Vapor Plume Analysis Results 5.15-14

5.16 Waste Management

Table 5.16-1 Summary of Applicable Waste Management LORS 5.16-1
Table 5.16-2 Agencies and Agency Contacts 5.16-7
Table 5.16-3 Permits Required and Permit Schedule 5.16-7
Table 5.16-4 Solid and Hazardous Waste Disposal Facilities 5.16-8
Table 5.16-5 Summary of Construction Waste Streams and Management Methods 5.16-11
Table 5.16-6 Summary of Operation Waste Streams and Management Methods 5.16-13

5.17 Water Resources

Table 5.17-1 LORS Applicable to Water Resources 5.17-1
Table 5.17-2 Water Resources Agencies and Contact Information 5.17-9
Table 5.17-3 Required Water Resources Permits and Schedule 5.17-10
Table 5.17-4 Cantil, California Climate and Precipitation Summary1 1971 through 2000 ..... 5.17-11
Table 5.17-5 Well Completion Data for Water Supply Wells on the Plant Site 5.17-16
Table 5.17-6 Aquifer Test Results 5.17-18
Table 5.17-7 Summary of Water Quality Data Water Samples Collected from Well Nos. 43, 48 and 63 ..... 5.17-20
Table 5.17-8 Well Completion Details Water Supply Wells within a One Mile Radius of the Plant Site 5.17-23
Table 5.17-9 Estimated Water Usage 5.17-30
Table 5.17-10 Waste Constituent Concentrations at Points within the Process and Discharge to the Evaporation Ponds 5.17-34

5.18 Worker Safety

Table 5.18-1 Worker Safety LORS Summary 5.18-1
Table 5.18-2 Potentially Applicable Topics Addressed in Title 8 CCR 5.18-4
Table 5.18-3 Fire Protection Association Fire and Explosion Hazards Standards 5.18-7
Table 5.18-4 Agencies and Agency Contacts 5.18-8
Table 5.18-5 Permits and Approvals 5.18-9
Table 5.18-6 Project Hazard Analysis (Construction and Operations Phases) 5.18-10
Table 5.18-7 Basic Protective Equipment Guide 5.18-15
Table 5.18-8 Training Programs and Target Employees (Construction and Operation Phases) 5.18-16

List of Figures

1.0 Executive Summary

Figure 1-1 Regional and Vicinity Map 1-12
Figure 1-2 Project Site and Surrounding Area 1-13

2.0 Project Description

Figure 2-1 Plant Site and Linear Facilities 2-33
Figure 2-1 Plant Site Photographs – Existing Conditions 2-34
Figure 2-3a Plant Site without Simulated Project Facilities 2-35
Figure 2-3b Plant Site with Simulated Project Facilities (Transmission Line Option 1) 2-36
Figure 2-4 General Arrangement – Plant Site 2-37
Figure 2-5 General Arrangement – Power Block Only 2-38
Figure 2-6 Elevation View of Project Facilities 2-39
Figure 2-7 Heat Balance Diagram 2-40
Figure 2-8 Typical Trough Solar Collector 2-41
Figure 2-9 Aerial Photograph of Kramer Junction SEGS Site 2-41
Figure 2-10 Plant Site Electrical System One-Line Diagram 2-42
Figure 2-11 Project Interconnection One-Line Diagram 2-43
Figure 2-12 Water Balance Diagram – Summer 2-44
Figure 2-13 Water Balance Diagram – Annual 2-45
Figure 2-14a Transmission Line Route – Existing Conditions 2-46
Figure 2-14b Transmission Line Route With Simulated BSEP Facilities 2-47
Figure 2-15 Barren Ridge Switching Station – Equipment Plan 2-48
Figure 2-16 Barren Ridge Switching Station – One-Line Diagram 2-49
Figure 2-17 Project Switching Station – Plan View 2-50

4.0 Project Alternatives

Figure 4-1 Alternate Site Locations Initially Considered 4-22
Figure 4-2 Alternative Natural Gas Pipeline Routes 4-23
Figure 4-3 Example Solar Power Generating Technologies 4-24

5.2 Air Quality

Figure 5.2-1 Annual Wind Rose for Mojave, California 5.2-50
Figure 5.2-2 Locations of Stacks and Buildings for the GEP Analysis 5.2-51

5.3 Biological Resource

Figure 5.3-1 Plant Site and Survey Area 5.3-46
Figure 5.3-2 Historic Biological Resources 5.3-47
Figure 5.3-3 Vegetation Communities 5.3-48
Figure 5.3-4 Desert Tortoise and Sign 5.3-49
Figure 5.3-5 State Jurisdictional Waters 5.3-50
Figure 5.3-6 Groundwater Pump Stations at the Beacon Solar Energy Project Site 5.3-51
Figure 5.3-7 Other Special Status Biological Resources Observed 5.3-52
Figure 5.3-8 Burrowing Owls and Sign 5.3-53

5.5 Geologic Hazards and Resources

Figure 5.5-1 Regional Geology in the Koehn and California City Sub-basins 5.5-14
Figure 5.5-2 Plant Site Plan vs. Alquist-Priolo Fault Zones 5.5-15
Figure 5.5-3 Plant Site Layout vs. Alquist-Priolo Fault Zones 5.5-16

5.7 Land Use

Figure 5.7-1 BSEP Land Use Study Area 5.7-14
Figure 5.7-2 Joint Service Restricted R-2508 Complex Full View 5.7-15
Figure 5.7-3 Military Review Requirements 5.7-16
Figure 5.7-4 Kern County General Plan Land Use Designations 5.7-17
Figure 5.7-5 Cantil Rural Community Plan Area 5.7-18
Figure 5.7-6 Kern County Zoning Designations 5.7-19

5.8 Noise

Figure 5.8-1 Noise Sampling Locations 5.8-16
Figure 5.8-2 Operational Noise Contour Map (Offsite Receptors) 5.8-17

5.9 Paleontological Resources

Figure 5.9-1 Locations of Paleontologically Sensitive Geologic Units Underlying the BSEP Plant Site and Linear Facilities 5.9-12

5.10 Public Health

Figure 5.10-1 Population Density Map 5.10-19

5.11 Socioeconomics

Figure 5.11-1 Regional Economic Setting 5.11-33
Figure 5.11-2 Percent Minority by Census Block Group 5.11-34
Figure 5.11-3 Proportion Below Poverty Level by Census Block Group 5.11-35

5.12 Soils

Figure 5.12-1 Soils Map 5.12-2

5.13 Traffic and Transportation

Figure 5.13-1 Regional Transportation Access 5.13-20
Figure 5.13-2 Local Transportation Access 5.13-21
Figure 5.13-3 Peak Month Project Construction Traffic 5.13-22

5.14 Transmission Line Safety and Nuisance

Figure 5.14-1 Structure Elevation 5.14-12
Figure 5.14-2 Magnetic Field 5.14-13
Figure 5.14-3 Electric Field 5.14-14

5.15 Visual Resources

Figure 5.15-1a Regional Visibility of the Project Site (Option 1) 5.15-17
Figure 5.15-1b Regional Visibility of the Project Site (Option 2) 5.15-18
Figure 5.15-2a Local Visibility of the Project Site (Option 1) 5.15-19
Figure 5.15 2b Local Visibility of the Project Site (Option 2) 5.15-20
Figure 5.15-3 Project Site and Key Observation Points 5.15-21
Figure 5.15-4a View from KOP-1 Looking Southwest Toward BSEP Site – Existing Condition 5.15-22
Figure 5.15-4b View from KOP-1 Looking Southwest Toward BSEP Site – Simulated Condition with Transmission Option 1 ..... 5.15-23
Figure 5.15-4c View from KOP-1 Looking Southwest Toward BSEP Site – Simulated Condition with Transmission Option 2 ..... 5.15-24
Figure 5.15-5a View from KOP-2 Looking Northwest Toward BSEP Site and Segment 1 ROW – Existing Condition 5.15-25
Figure 5.15-5b View from KOP-2 Looking Northwest Toward BSEP Site and Segment 1 ROW – Simulated Condition with Transmission Option 1 ..... 5.15-26
Figure 5.15-5c View from KOP-2 Looking Northwest Toward BSEP Site and Segment 1 ROW – Simulated Condition with Transmission Option 2 ..... 5.15-27
Figure 5.15-6a View from KOP-3 Looking East Toward BSEP Site – Existing Condition 5.15-28
Figure 5.15-6b View from KOP-3 Looking East Toward BSEP Site – Simulated Condition with Both Transmission Options 5.15-29
Figure 5.15-7a View from KOP-4 – Existing Condition 5.15-30
Figure 5.15-7b View from KOP-4 – Simulated Condition with Transmission Option 1 ..... 5.15-31
Figure 5.15-7c View from KOP-4 – Simulated Condition with Transmission Option 2 ..... 5.15-32
Figure 5.15-8a View from KOP-5 – Existing Condition 5.15-33
Figure 5.15-8b View from KOP-5 – Simulated Condition with Both Transmission Options 5.15-34
Figure 5.15-9a View from KOP-6 – Existing Condition 5.15-35
Figure 5.15-9b View from KOP-6 – Simulated Condition with Transmission Option 1 ..... 5.15-36
Figure 5.15-9c View from KOP-6 – Simulated Condition with Transmission Option 2 ..... 5.15-37
Figure 5.15-10a View from KOP-7 – Existing Condition 5.15-38
Figure 5.15-10b View from KOP-7 – Simulated Condition with Transmission Option 1 ..... 5.15-39
Figure 5.15-10c View from KOP-7 – Simulated Condition with Transmission Option 2 ..... 5.15-40
Figure 5.15-11a View from KOP-8 – Existing Condition 5.15-41
Figure 5.15-11b View from KOP-8 – Simulated Condition with Transmission Option 1 ..... 5.15-42
Figure 5.15-11c View from KOP-8 – Simulated Condition with Transmission Option 2 ..... 5.15-43

5.17 Water Resources

Figure 5.17-1 Sub-basins of the Fremont Valley Groundwater Basin 5.17-40
Figure 5.17-2 Regional Geology in the Area of the Project Site 5.17-41
Figure 5.17-3 Water Level Contour Map (2007) 5.17-42
Figure 5.17-4 Hydrographs of Selected Key Wells within the Koehn Sub-basin 5.17-43
Figure 5.17-5 Groundwater Recovery Rates – Koehn Sub-basin 5.17-44
Figure 5.17-6 Site Map Showing Wells on the Project Site 5.17-45
Figure 5.17-7 Cone of Depression at the End of the Well No. 63 Pumping Test 5.17-46
Figure 5.17-8 Cone of Depression at the End of the Well No. 48 Pumping Test 5.17-47
Figure 5.17-9 Cone of Depression at the End of the Well No. 43 Pumping Test 5.17-48
Figure 5.17-10 Post-pumping Test Water Level Contour Map (October 2007) 5.17-49
Figure 5.17-11 TDS Concentrations 1953-1958 and 1999-2007 ..... 5.17-50
Figure 5.17-12 AVEK and California City Boundaries 5.17-51
Figure 5.17-13 Water Supply Wells Identified from Field Survey 5.17-52
Figure 5.17-14 100-Year Floodplain Map 5.17-53
Figure 5.17-15 Project Water Supply Wells and Pine Tree Creek Diversion 5.17-54
Figure 5.17-16 Groundwater Model Predicted Drawdown – Site Grading Period 5.17-55
Figure 5.17-17 Influence from Groundwater Pumping (Well No. 48) - 30 Years 5.17-56
Figure 5.17-18 Influence from Groundwater Pumping (Well No. 63) - 30 Years - Influence from Groundwater Pumping (Well No. 63) - 30 Years 5.17-57