



TRAININGS

Management and Finance
Cornell University
Asian Institute of
Management
De La Salle University

Training Program on
Project and Program
Management for the
Philippines conducted by
the Association for
Overseas Technical
Scholarship (AOTS) in
Tokyo, Japan in Feb 2010

MR. DON MARIO Y. DIA



WORK EXPERIENCE

Senior Vice President
AC Energy Development, Inc. (Ayala Company)

Director and Treasurer
Bronzeoak Philippines, Inc.

Vice Chairman
San Carlos Biopower, Inc.

Financial Adviser
San Carlos Solar Energy, Inc.

Has over 25 years of experience

Corporate finance, retail and investment banking, risk assets and general administration. He also possesses a unique combination of expertise in banking, logistics, risk management, customer satisfaction, information technology, six-sigma orientation, program and project management, energy development and organizational restructuring.

San Carlos Solar Energy

Philippines 1st Utility Scale
Solar Power Plant



Presented by: Don Mario Y. Dia

SACASOL IA & IB

22MW DC Ground-Mounted Solar Plant
The Philippines' First FIT-Eligible Solar Farm



Presentation Outline

1. Rationale
2. Project Development Overview
3. Challenges / Issues
4. Trailblazing Solar Development
5. Technical Details
6. CSR
7. Recognitions

Why Solar Energy?

Help address growing demand for power

- Most reliable form of power generation
- Fastest to construct
- Good source to address peak demand

Energy independence and security

- Increase self sufficiency in energy supply
- De-risk uncertainties of imported oil
- Hedge against increasing volatility of price of coal
- Decentralized application in remote or off grid networks

Why Solar Energy?

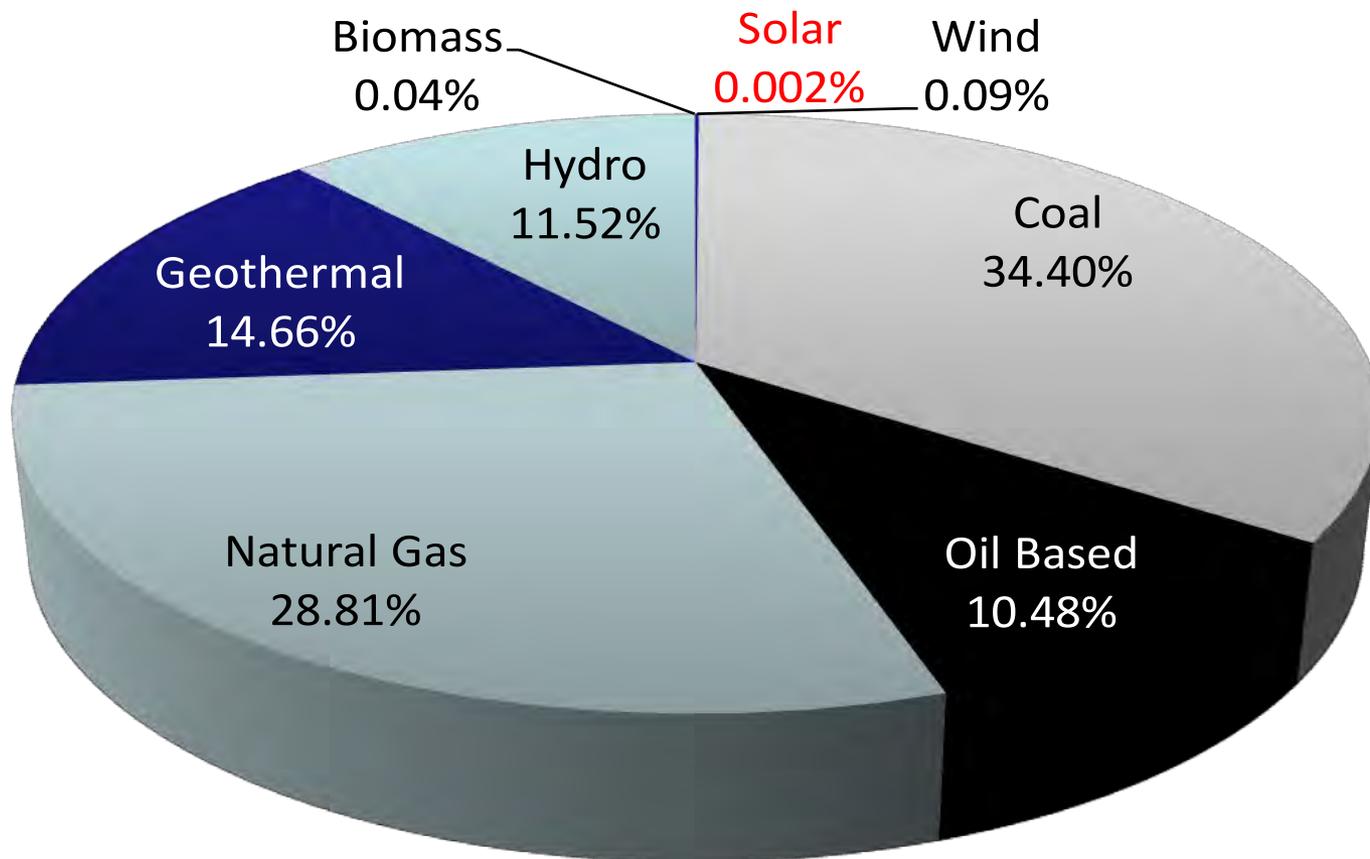
Guaranteed Market

- Renewable Energy Act 9513 of 2008
- Financial Incentives (e.g. ITH, VAT-free)
- Priority dispatch provides guaranteed market
- Feed-in-tariff of US \$ 0.21/kWh for the first 50MWp
- Increased allocation up to March 2016 at US \$0.19 for the next 450 MWp

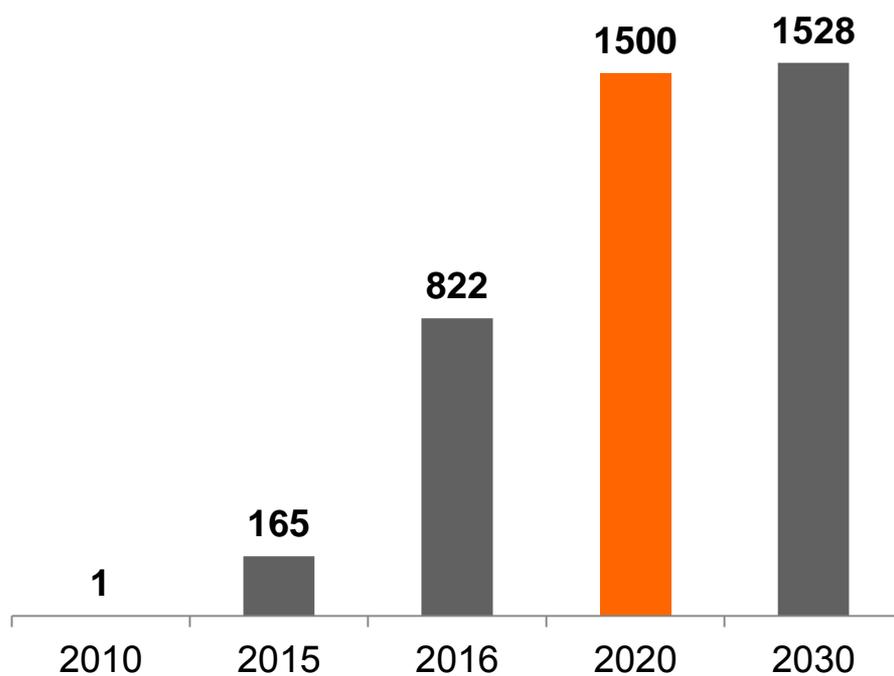
Minimal Environmental Impact

- Silent, clean and unobtrusive
- Physically inert and environmentally benign
- No emissions or by-products
- Easy to sell to local communities, civil society, local government units

Current Energy Mix



Growth of Solar Energy in the Philippines



Installed Capacity (MW)

- On Dec 2015, installed capacity is 165 MW ¹
- As of April 2016, installed capacity is at around 822 MW ²
- DOE's target installation capacity for solar is 1,528 MW by 2030 ¹

Sources:

¹ Department of Energy

² Philippine Electricity Market Corporation

Project Development Overview

The Three Stages:

1. Planning and Development

- Market & Demand – Service Contract with Dept. of Energy
- Resource & Site Assessment
- Technical & Engineering
- Regulatory & Community (Permits and Endorsements)
- Viability & Risk Mitigation
- Documentation & Financing

2. Construction – Implementation

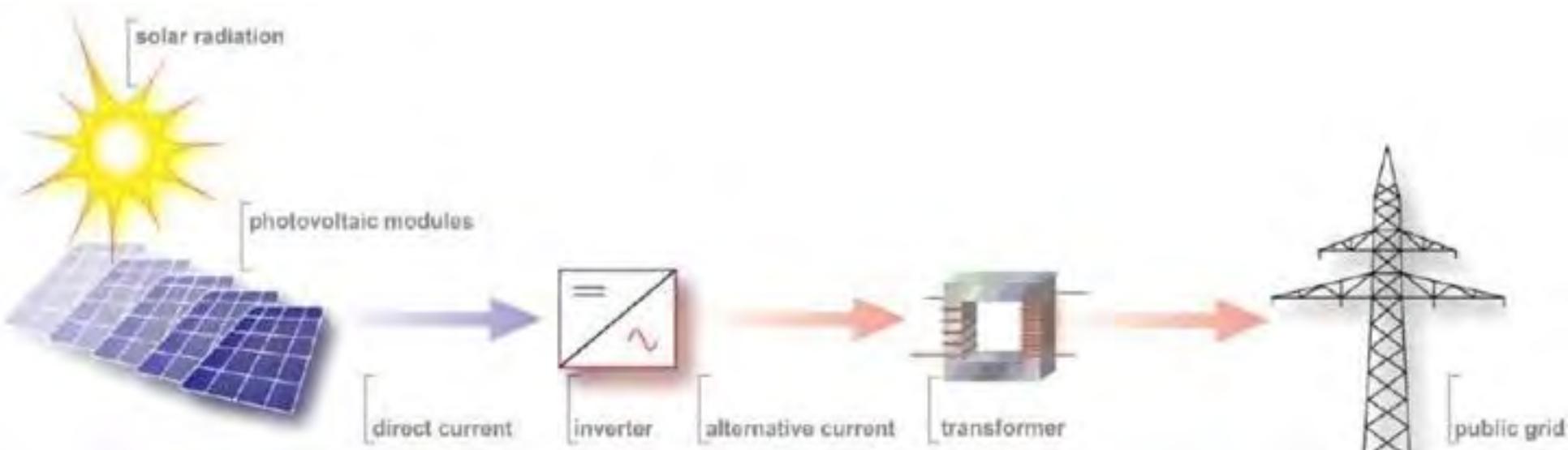
3. Commercial Operations

Project Overview

Developed by Brozeoak Philippines Inc. (BP) and Thomas-Lloyd Cleantech Infrastructure Fund (TL)



Project Flow Overview



Plant History

Date	Details
February 2013	Project Conceptualization
April 2013	Incorporation of SACASOL INC.
May 2013	Signing of Subscription Agreement, Site Earthworks
July 2013	Issuance of ECC
August 2013	Signing of EPC Contracts/ NTPs
October 2013	Signing of DOE Service Contract
December 2013	Facilities Study Completed
March 2014	SIS Completed, Issuance of DOE Confirmation of Commerciality
April 2014	80% Electromechanical Completion Reached, NGCP Connection Agreement Signed
May 2014	NGCP Certificate of Authority to Connect

Plant History



Plant History



Plant History



Plant History



Plant History



Plant History



Plant History



Plant History



Regulatory Permitting

- Thirty five (35) major permits involving three hundred nine (309) signatures
- Decentralized permitting involving fourteen (14) government agencies:
DOE, NGCP, ERC, Transco, PEMC, BOI, BIR, SEC, BOC, DAR, DENR, NCIP, LGU's

Regulatory Permitting

Issuing Body	Signatures
Local Government Unit	88
Department of Energy	82
Energy Regulatory Commission	45
Board of Investments	29
Bureau of Internal Revenue	26
National Commission on Indigenous Peoples	14
Philippine Electric Market Corporation	10
Bureau of Customs	5
National Transmission Corporation	5
Department of Environment and Natural Resources	4
Securities and Exchange Commission	1
TOTAL	309

Challenges / Issues: First Solar Plant

Pioneering the Regulatory Framework

- Gov't agencies are not familiar with the development of solar projects
- No clear guidelines and standards for permitting
- Varying lists of technical requirements to comply (e.g. NGCP's grid connection parameters and ERC's Resolution No. 7)
- Anticipating possible shifts in Gov't policies or priorities
- Solar FIT Allocation on the first 50MWp was on a "FIRST COME, FIRST SERVED" basis

Challenges / Issues

Project Financing

- Securing term borrowing from commercial banks for a FIRST MOVER PROJECT with no track record of Government Feed-in-Tariff Payments
- Partnering with suitable equity partners or fund managers for both development & execution phase
- Thomas Lloyd/Bronzeoak Philippines took the risk of funding SACASOL at 100% equity

Challenges / Issues

Finding Suitable Sites

Characteristics:

- Relatively flat
- No shadows; High irradiance – NASA/Meteonorm
- Close to major road
- Economic distance to transmission line
- Hospitable local community
- Peace and order conditions

Challenges / Issues

Lack of Technical Expertise

- Difficult to look for a local contractor with adequate technical experience because of relatively new technology
- Lack of knowledge on how to optimize project construction resulted in an increase in project cost (e.g. design, work methods, tools, etc.)

Trailblazing Solar Development

SACASOL's pioneer work guided the agencies in establishing standards and procedures for solar development in the Philippines.

These guidelines were used for the first and succeeding rounds of the FIT Program.

SACASOL has paved the way for other solar developers in the country.

Solar Projects under the DOE Feed-In Tariff Program

Round	FIT Rate	Projects	Capacity (MW)
1 st Round (Awarded)	P 9.68/ kWh	7	108.9
2 nd Round (Awarded)	P 8.69/kWh	17	417.05
Other Operational Projects as of April 2016	--	11	296.05
Total			822

SACASOL Inauguration



May 15, 2014 Inauguration by Pres. Benigno Aquino III

Technical Specifications

Technical Facts of SaCasol Solar PV Plant

PV Technology/ Module:	Conergy PH 250P/PH245P, Polycrystalline
Mounting Structure:	Conergy SolarLinea II, 10° tilt
Inverter Specifications:	SMA Sunny Central 900CP XT
Plant DC capacity in kWp:	13 MWp (Phase 1) + 9 MWp (Phase 2)
Plant AC capacity in kW:	11.7MW (Phase 1) + 8.1MW (Phase 2)
No. of Modules:	44016 nos. x PH250P & 8160 nos. x PH245P (Phase 1) 28008 nos. x PH250P & 8160 nos. x PH245P (Phase 2)
No. of Modules per string:	24

No. of Strings per SCB:	34/33/32
No. of SCB per Inverter:	5
No. of Inverters:	13 nos. of SMA900CP XT (Phase 1) + 9 nos. SMA900CP XT (Phase 2)
No. of Transformer:	7nos. x 2.25MVA 13.2kV/405V/405V & 1no. x 27.5MVA 69kV/13.2kV (Phase 1) 4nos. x 2.25MVA 13.2kV/405V/405V & 1no. x 27.5MVA 69kV/13.2kV (Phase 2)
Inverter Substation Voltage:	405V/13.2kV
Grid Connection Voltage	13.2kV/69kV
No. of Grid Connection point	1

Equipment Specifications

Items	Description	Manufacturer	Type	Specifications
PV Modules	Conergy PH250P & Conergy PH245P	Conergy	Framed Polycrystalline Cell	245Wp & 250Wp Module
Inverters	Sunny Central 900CP XT	SMA	Outdoor	900kVA
Solar Cables	SolarVill PV1-F	Kabelwerke Villingen	Outdoor /UV Proof	6mm ²
Connectors	Solar Cable Connectors	Sunbolts	Outdoor	1000VDC rated
String Combiner Box	Hensel DC String Combiner Box	Hensel	Outdoor	1000VDC/600A/Double Insulated
Mounting System	PV module mounting	Conergy	Solar Linea II	Aluminium
DC Monitoring System	Strings & Inverter	SMA/Hensel	Fibre Optic/Wireless	Fibre Optic/Wireless
DC Cables	AL-XLPE/SWA/PVC	Fujikura	Direct Buried	240mm ² /1000VDC
MV Cables	AL-XLPE/SWA/PVC	Fujikura	Direct Buried	185/400mm ² 15kVA

Community Development Project



Community Impacts

No Pollution

- Only sunlight needed for Plant to operate
- No fuel necessary
- No air pollution or sound discharge
- No waste generated



Benefits



- Provides employment opportunities
- Supports national laws (RE Act)
- Increased availability of electricity

Benefits



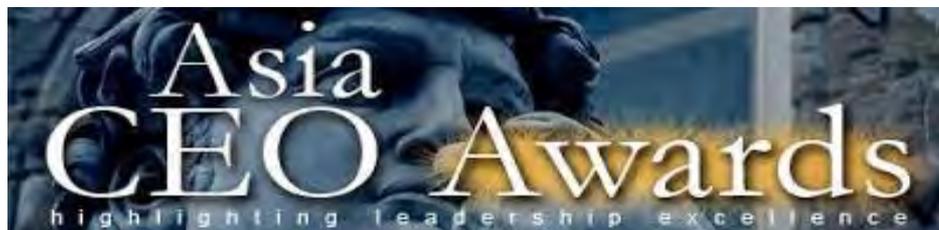
- Environmentally friendly technology in power generation
- Reduce Greenhouse Gas emissions from fossil-fuel burning in power generation, abates global warming
- Clean, green, and sustainable energy

Awards

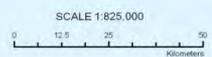
- Green Company of the Year at the Asia CEO Awards for 2014
- Solar Power Project of the Year at the Asian Power Awards 2014
- 2014 Frost & Sullivan Philippines Solar Photovoltaic System Integrator of the Year



Some industry awards we've received



PROJECT SITES



143 MWDC of Solar Energy



45MWDC Solar Farm
San Carlos City, Negros Occidental



48MWDC Solar Farm
Manapla, Negros Occidental
32MWDC Solar Farm
La Carlota City, Negros Occidental



18MWDC Solar Farm
Bais City, Negros Oriental

SACASOL Construction Time Lapse



THANK YOU

**SACASOL: Philippines 1st Utility Scale
Solar Power Plant**