



CONERGY

Off-Grid Case Study: Bandung Polytechnic

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AGENDA

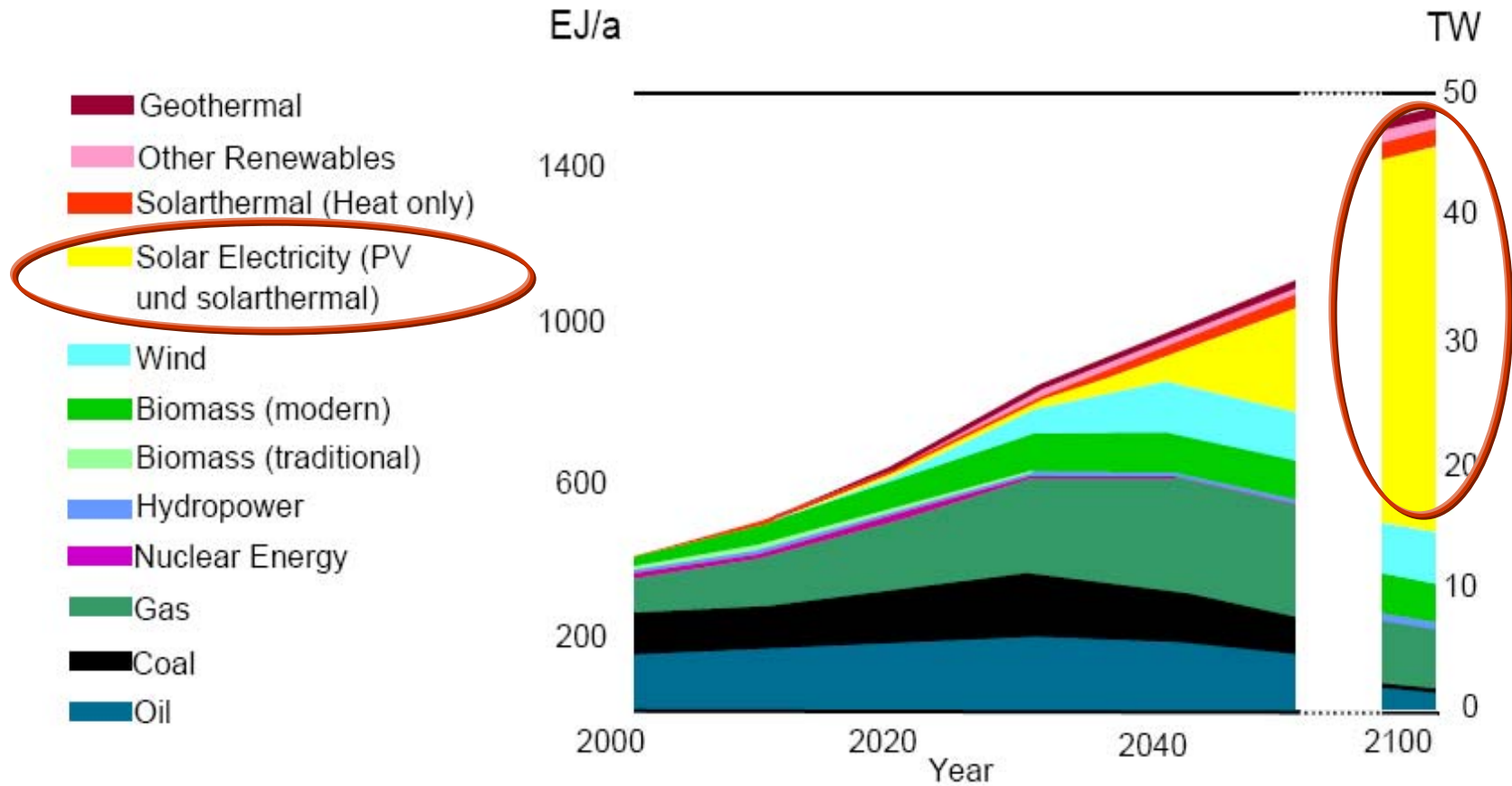
Trends on solar energy

Key Success Factors and Risks in developing PV Power Plants

Off-grid Case study

Overview Conergy Group

Primary Energy Consumption Scenario – Solar on the rise



Advantages of Photovoltaic Applications

- | Fast Construction
 - | Rapid Engagement
- | Business Value
 - | Easy Project Cost Controlling (needs less components)
 - | Track record of achieving Cost Savings
- | Proven, Reliable Technology
 - | Expected output is achieved
 - | Thousands of Installed Deployments
- | Flexibility & Modularity
 - | Size & Space Demands
 - | Multiple Configurations & Applications
 - | Solar Plants
 - | Roof Top Installation
 - | Building Integrated
 - | Suitable for both On and Off grid systems
- | Output Warranties
- | Minimal O & M Requirements
- | Huge Growth Potential



Current status of large-scale PV projects in SEA and future growth opportunities



Thailand

- | ~40 MW of installed PV capacity by 2009
 - | Attractive adder (8 THB/kWh) under VSPP program
 - | PPA application >1.2 GW submitted to PEA
 - | Numerous large-scale projects in progress (up to 73 MW)
- ▶ Industry faces uncertain future for PPAs to be approved in 2011f due to discussed FIT cuts



Philippines

- | Since 2008 RE act pending
 - | Feed-in tariff for several RE technologies under discussion - parliament discussion postponed till Dec 2010
 - | Indicative FiT rate: 0,21 EUR/kWh for 21 yrs
- ▶ Market may prove to be attractive and more sustainable than Thai market



Malaysia

- | Cabinet has approved RE act in Apr 2010 - FiT will be launched at earliest by Q2/2011
 - | Indicative rate: 95 RM/kWh for 21 yrs period
 - | Target volume 2011: 9 MW
 - | FiT regime sees potentially higher FiT for local components
- ▶ Very limited PV market volume in the nearer future - incentive favors local industry



Indonesia

- | Strong off-grid market (rural electrification programs, telecom BTS applications)
 - | First initiatives driven by utility PLN et al
 - | Introduction of feed-in-tariff under discussion only
 - | Targeting 580 MW PV by 2025
- ▶ Potential market in the long term only

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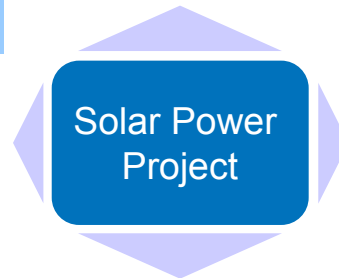
Key success factors of large-scale solar power projects

2 Power Purchase & Financing

- | Attractive government policy (eg, tax incentives)
- | Valid PPA with favorable terms (fixed adder for defined no of yrs)
- | Realistic assumptions & reasonable IRR expectations
- | Long-term financing & reasonable debt financing terms

1 Site

- | Favorable solar radiation profile & statistically reliable solar data
- | Long-term availability of land
- | Approved construction licenses
- | Proximity to grid connection point



4 Construction & Operation

- | Turn key with fixed price and COD
- | Performance and delay LD
- | Reliable O&M with fast response times
- | Proper training of partners and service team

3 Technology/Supplier

- | Proven track record of system integrator and partners
- | Mature technology and efficient system design
- | Quality of components and world-class SCM
- | Long-term product warranty schemes (module/inverter)
- | Favorable output performance guarantees

Key risk factors and mitigation strategies for PV projects in Asia

	Development risks	Mitigation strategies
Environment/ Government	<ul style="list-style-type: none"> Local suppliers could be protected by high duties and other regulations High country risks due to political turmoil Local community acceptance 	<ul style="list-style-type: none"> Intensive use of local suppliers/contractors Use of local banks, investors and government funding Deploy local road shows and CSR programs (create local jobs if possible)
Financing	<ul style="list-style-type: none"> Validity of PPA (incl. submission process) Banks with only limited experiences in PV project (non-recourse) financing Country-specific approval process and documentation standards Enforceability of contracts terms/warranties 	<ul style="list-style-type: none"> Understand local PPA characteristics Build early relationships with financiers Familiarize early with documentation requirements (local language) Intensive legal DD (legal counsel to review contract enforceability under local laws)
Technology/ Construction	<ul style="list-style-type: none"> Special component certification requirements by local authorities Reliability and durability of components Grid-connection related problems Component supply shortage 	<ul style="list-style-type: none"> Select only components which fulfill all local bank ability requirements Use reputable manufacturer & EPC partner with good track records Build close relationship to local grid owner

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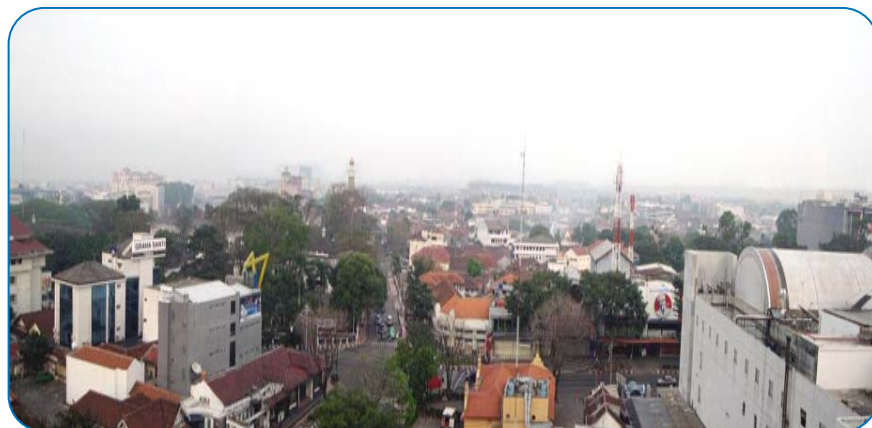
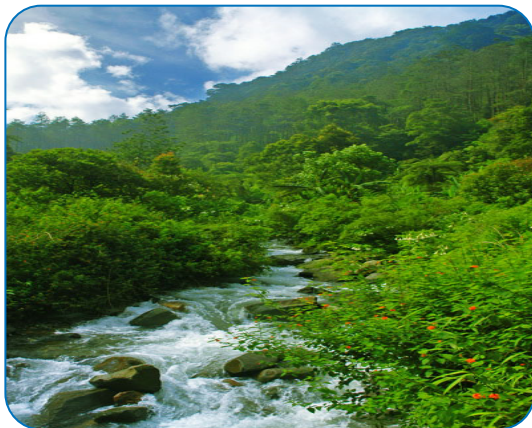
Key Success Factors and Risks in developing PV Power Plants

Off-grid Case study – Bandung Polytechnic

Overview Conergy Group

Bandung & Bandung Polytechnic

- | Bandung has over 40 institutions for higher learning and is among the most popular destinations for education in Indonesia.
- | One of the oldest and most prominent universities among them is Bandung State Polytechnic, a vocational education and training institution that offers courses in accountancy, management, the social sciences, technology and engineering.
- | In September 2009, Conergy received order to build 16 kWp rooftop system
- | Bandung Polytechnic has recently launched a Masters Degree in Renewable Energy
- | Fully functional PV system as an education instrument and support to generate clean energy to the university



Project Summary

- | Location: Bandung, Indonesia
- | Output: 16 kWp
- | Modules: Conergy PowerPlus 200P
- | Mounting Systems: Conergy SolarFamulus
- | Inverters: Conergy ISA 20K
- | Design & Engineering Services: Conergy/GMN
- | Date of Completion: January 2010

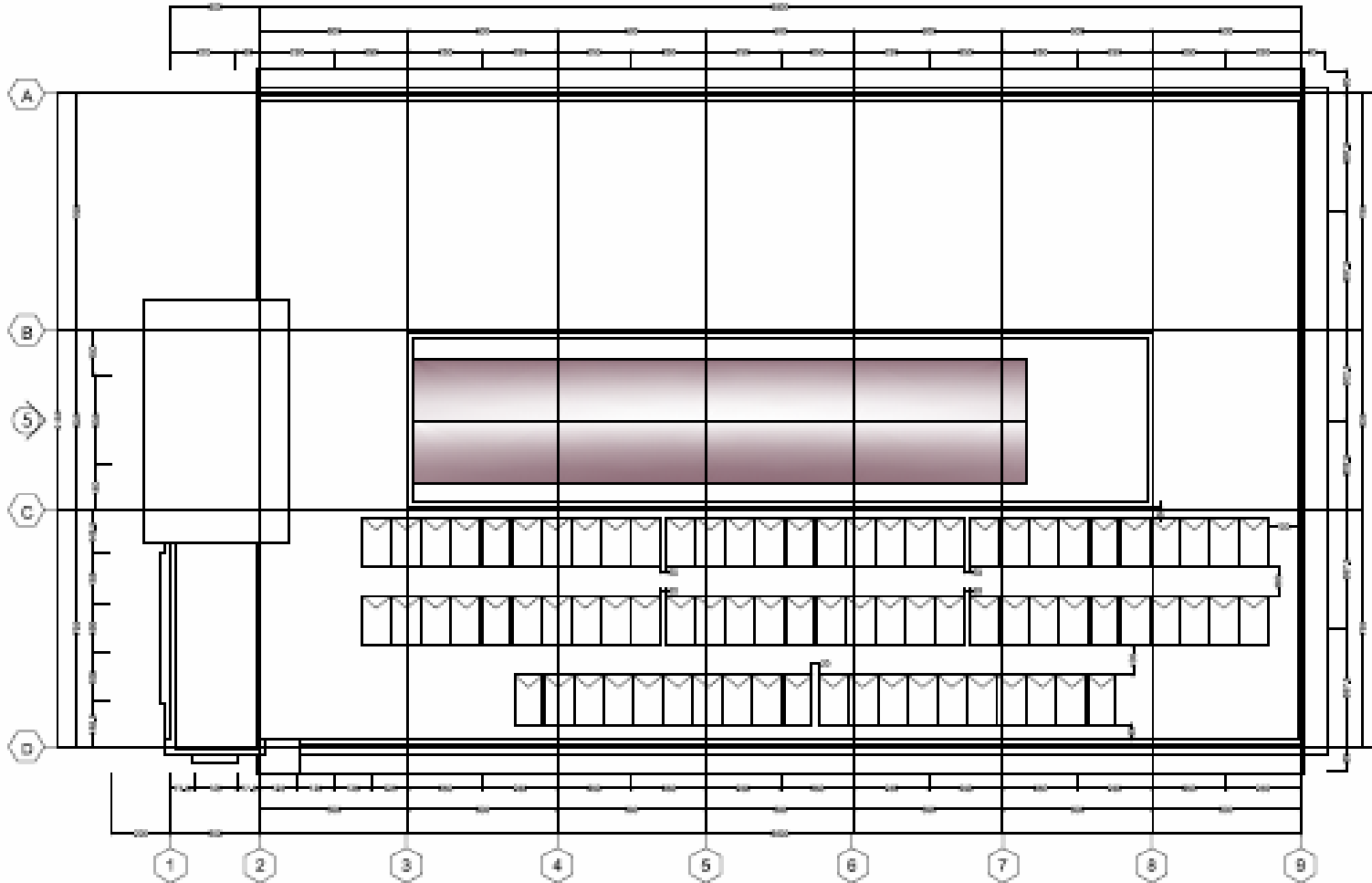


Factors to be considered

- | In designing an optimal system for Bandung Polytechnic, factors considered by the project team included
 - | the average daily electricity consumption of the building
 - | the available surface area on the building's rooftop.
 - | the length of power autonomy desired
 - | Battery: The intent was to charge the battery bank in the day. The systems we have designed have the optimum solar array sizes based on the battery capacity which in turn depends on.
- | For this system, a Conergy hybrid inverter was selected along with charge controllers that used the latest processor-controlled MPPT (maximum power point tracking) technology



System Layout



Project Progression

- | In a couple of weeks, the solar system was installed in partnership with Gerbang Multindo Nusantara (GMN), a Jakarta-based solar energy solution provider.
- | Spread over 130 sqm on the Energy building's rooftop are 80 Conergy PowerPlus 200wp polycrystalline modules neatly arranged in 3 rows which are expected to supply over 20,500 kW hours of clean energy a year.
- | Bandung Polytechnic one of the 1st universities to utilize Solar Energy



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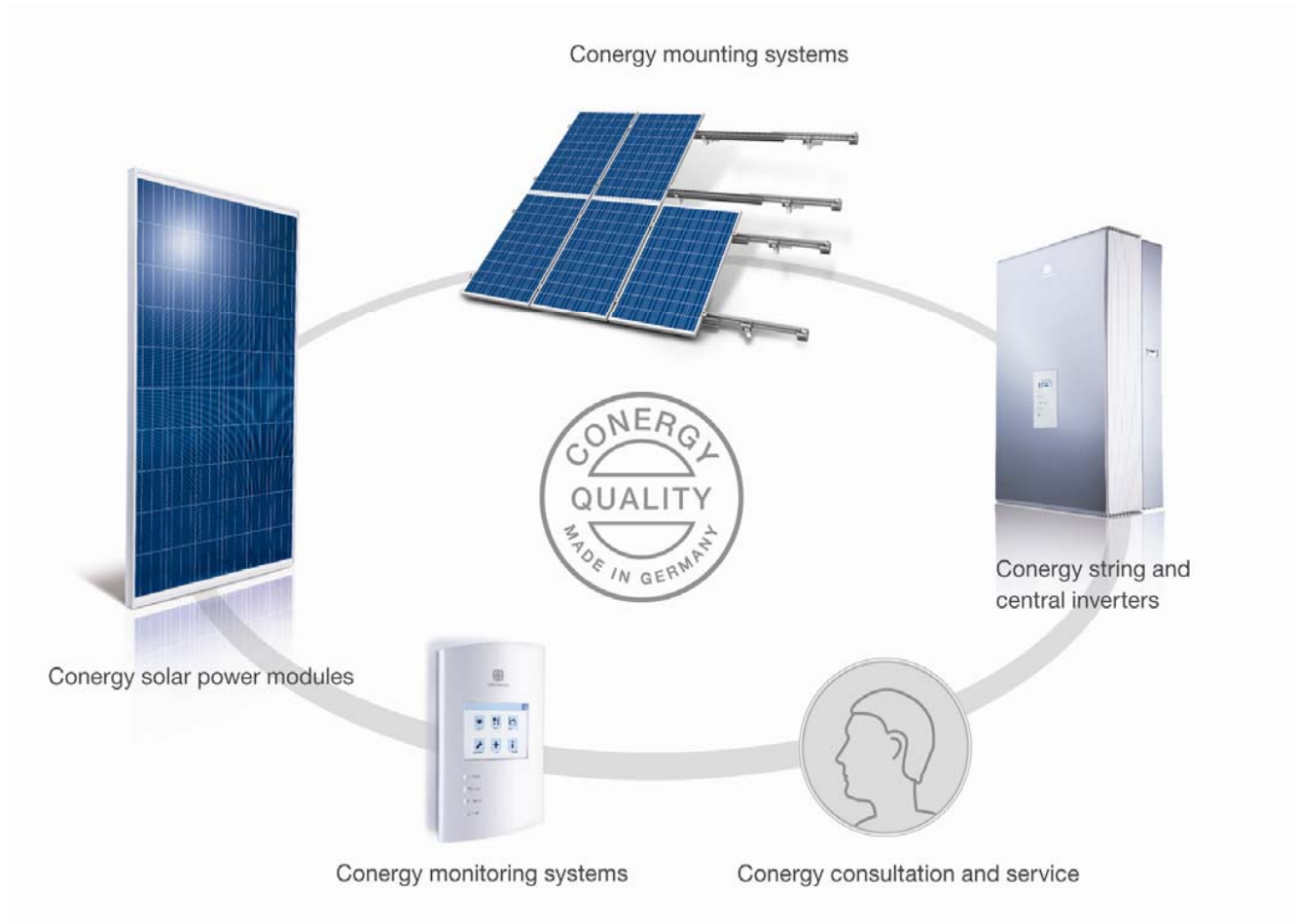
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Off-grid Case study

Overview Conergy Group

Conergy is the only supplier worldwide...



...of in-house manufactured solar system solutions

Conergy is one of Europe's leading solar companies...

Group Key Facts



- | TecDAX listed since 2005
- | € 1.0 bn revenue in 2008
- | 1,750 employees

Close to the customer



- | Present in 16 countries – on four continents
- | 10,000 customers served
- | APAC HQ in Singapore



Strong in sales



- | Almost 1 GW solar modules worldwide sold
- | 460 MW installed in solar projects

Experienced in PV power plants



- | Korea (24 MW, 2008)
- | Germany (19 MW, 2010)
- | Thailand (3 MW, 2010)

...over 10 years of experience in the photovoltaic business

Solar Home Systems – Riau and Maluku Islands, Indonesia

- | Location: Riau and Maluku, Indonesia
- | Output: 4,620 homes with 50Wp systems
- | Modules: Conergy Q50PI 50Wp modules
- | Design & Engineering Services: Conergy/GMN
- | Date of Completion: November 2009



Yanhee Solar – Ayutthaya, Thailand

- | Location: Ayutthaya, Thailand
- | Output: 3 MWp
- | Modules: 40,000 on 64,000 m²
- | 4471 MW of clean energy produced/yr
- | 1971 tons of carbon emissions saved/yr

**Largest private solar plant in Thailand
(as of March 2010)**



SinAn – South Korea

| Location: SinAn

| Start of operation: June 2008

| Output: 24 MWp

| N° of modules: 130,000

| Covers electricity needs
of 7,200 homes

**The world's largest solar power
plant with tracking systems.**



KAUST – Thuwal, Kingdom of Saudi Arabia

| Location: Thuwal, Saudi Arabia

| Output: Approx. 2 MWp

| N° of modules: 9306, on 11,577 m²
roof surface

| System covers equivalent electricity
needs of 330 HH/yr

First large scale solar park in Saudi Arabia





CONERGY

Our world is full of energy