Case Study of a 20 MW PV Power Plant in El Salvador

Large-Scale Photovoltaic Power Plants for Developing Countries

Fred Wendt, March 2012
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**Agenda**

- Introduction of ILF Group
- Project Description
- Methodology
- Technical Assessment
- Financial Implications
- Conclusions
- Visualization
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Introduction of ILF Group

Company

- Established by Mr. P. Lässer in 1967,
  In 1969 Mr. A. Feizlmayr joined the company → ILF
- Completely independent (100% privately owned) with no affiliation to construction companies, suppliers or financial institutions.
- Client relations with international / multilateral financial institutions such as World Bank, ADB, EBRD, EIB, KfW.
- Over 4,500 successful projects performed by 30 offices worldwide.
- Permanent staff 2011: 1810.
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Introduction of ILF Group

Business Areas

Oil & Gas
- Production facilities for oil and gas
- Pipeline systems
- Tank farms and underground storage facilities
- Refineries and petrochemical plants

Water & Environment
- Water supply
- Wastewater treatment and disposal
- Waste treatment and disposal
- Hydropower, dam and river engineering

Energy & Climate Protection
- Thermal power plants
- Sea water desalination plants
- Renewable energy
- Climate protection
- Electric transmission and distribution systems

Transport & Structures
- Airports
- Roads
- Railway systems
- Tunnels and caverns
- Buildings and structures
- Alpine engineering
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Introduction of ILF Group

- Integrated Consulting and Planning Expertise

- Geology and Hydrogeology
- Geotechnical engineering and soil mechanics management
- Urban and environmental planning and institutional strengthening
- Design of load-bearing structures
- Information management and GIS
- Automation and SCADA
- Project development
- Telecommunications
- Safety and risk
- Financial analysis
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Introduction of ILF Group

- **Main Focus in Renewable Energy Sector**

  - **Energy & Climate Protection**
    - Thermal power plants
    - Sea water desalination plants
    - **Renewable energy**
    - Climate protection
    - Transmission and distribution systems

- **Hydropower**
- **CSP**
- **Photovoltaic**
- **Energy Efficiency**
- **Waste to Energy**
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Introduction

- “15 de Septiembre” 14.2 MW (240,000 m²)
- “Guajoyo” 3.6 MW (61,000 m²)
- Funded by KfW
- Client CEL (Comision Ejecutiva Hidroelectrica del Rio Lempa)
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Project Description

- Installed power 14.2 MW
- Module tilt of 12°
- 60,480 x Module 235 W
- 840 x Inverter 15 kW
- ~10,500 piles
- Grid connection 46 kV
- Performance Ratio 78.5%
- Specific Yield 1,615 kWh/kW
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Project Description

**Results Conceptual Plant Design Guajoyo**

- Installed power 3.6 MW
- Module tilt of 12°
- 15,552 x Module 235 W
- 216 x Inverter 15 kW
- ~3,000 piles
- Grid connection 46 kV
- Performance Ratio 80.8%
- Specific Yield 1,605 kWh/kW
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Methodology

Key Questions

- Rapidly evolving technologies
- Favorable political and societal conditions
- Secure revenue structures
- Sustainable investments
- Low-emission
- High operational safety

- Project reliability
- Changing political and economic market conditions
- Availability of renewable energy sources

How can the potential electricity generation of the sites in El Salvador be maximized, and technical and legal framework risks be minimized?