



Insight Conference
How to Profit from the Business of
Renewable Energy
October 20, 2003, Hilton Toronto

SMS Energy-Engineering Inc.
Safouh Soufi

The Company

SMS is a consulting company that specializes in the engineering & PM of power generation projects for:

- 1. Thermal Power Stations**
- 2. Combined-Cycle Plants**
- 3. Renewable Energy Projects**

The Services

**Engineering Audits & Due Diligence
Feasibility & Cost Estimates Studies
Plant Performance Specialists
Owners and Bankers Engineer
Deregulated Market IT Services**

The People

Over 35 multi-discipline engineers & professionals with extensive experience in all aspects of power projects.

Our Associates provide high-quality and cost-effective engineering and management services.

The Experience

North America

100 MW Combined Cycle Power Plant

4 MW LFG-Fired Reciprocating

2 x 2.5 MW Biofuel Fired C. Turbine

53 MW Cogeneration Facility

120 MW Combined Cycle Plant

The Experience

China

2x350 MW Thermal Power Station

Pakistan

2 x 420 MW Oil-Fired C.C. Plant

385 MW Combined Cycle Plant

Thailand

2 x 700 MW Thermal Station

The Experience

Indonesia

415 MW Thermal Power Station

Philippines

300 MW Thermal Power Plant

Japan

900 MW Thermal Power Plant

The Experience

Colombia

120 MW Combined Cycle Plant

Mexico

110 / 90 MW Combustion turbines

Myanmar

30 MW Rice Husk-Fired Plant

Why Technical Due Diligence

- **Establish Technical Feasibility**
- **Verify Economic Viability**
- **Assess Potential Risks**
 - 1) **Technical**
 - 2) **Regulatory**

Type of Renewable Projects

- **Biomass**
- **Hydro**
- **Wind**
- **Solar**
- **Fuel Cells**
- **Geothermal**
- **Ocean**

Biomass Power

- **Direct Combustion**
- **Anaerobic Digestion**
- **Gasification**
- **Pyrolysis**
- **Co-Firing**

Hydro Power

- **Large Hydro: Impoundment**
- **Small Hydro: Run-of-River**
- **Pumped Storage**

Wind Power

- **Wind Farm**
- **Distributed Wind**

Solar Power

- **Photovoltaic Cell**
- **Concentrating Solar Thermal**
- **Solar Hybrid System**

Fuel Cells

- **Phosphoric Acid Fuel Cells**
- **Regenerative Fuel Cells**
- **Solid Oxide Fuel Cells**

Geothermal Power

- **Dry Steam System**
- **Flash Steam System**
- **Binary System**

Ocean Power

- **Wave**
- **Tidal**
- **Thermal Energy Conversion**

Basis of Technical Evaluation

- **Project Business Case**
- **Site Specific Studies**
- **EPC Document**
- **Contracts: PPA, Fuel & Others**

Project Technical Evaluation

- **Site Location and Permits**
- **Engineering and Design**
- **Construction**
- **Performance Testing**
- **Operations & Maintenance**

Site Location & Permits

- **Fuel Supply – Resource Studies**
- **Licensing, Permits & Approvals**
- **Access to Grid**
- **Water**
- **LMP**

Engineering & Design

- **Technology Risks & Suitability of:**
 - 1) Civil & Structural**
 - 2) Mechanical Systems**
 - 3) Electrical & Control Systems**
- **EPC Scope of Supply**
- **Project Availability & Reliability**
- **Estimated Project Life**
- **Vendor/Contractor Warranties**

Construction

- **Vendor/Contractor Experience**
- **Project Costs**
- **Procurement of Critical Equip.**
- **Construction Schedule**
- **Delay Liquidated Damages**
- **What Constitute Change Orders**

Performance Testing

- **Meeting Contract Guarantees:**
 - 1) **Plant Output**
 - 2) **Plant Efficiency**
 - 3) **Plant Availability**
 - 4) **Plant Reliability**
- **Buy-Down Criteria**

Operations & Maintenance

- **O&M Contractor's Experience**
- **O&M Planning and Budget**
- **O&M Staff Training**
- **Availability of Local Resources**
- **Accessibility to Spare Parts**