

APP Power Generation & Transmission Task Force

Chair: Mr. Jarad Daniels, USA
Mr. Scott Smouse, USA (Acting)
Co-Chair: Mr. Guo Wei, China



APP PG&T Task Force

Four major task statements:

- Identification and Implementation of Applicable Best Practices for Power Generation
- Identification and Implementation of Applicable Best Practices for Transmission & Distribution
- Identification and Implementation of Applicable Best Practices for Demand Side Management
- Information Sharing Consistent with Clean Development and Climate Change

At Joint Task Force Meeting in March 2008, agreed to revise Action Plan, including overall strategy

APP PG&T Task Force

Review of Power Generation
Best Practice Activities

Power Generation Best Practices (PGT-06-01)

American Electric Power (AEP) Site Visit

- Held 30 Oct. – 4 Nov. 2006
- 100 attendees from 6 inaugural APP nations, including 40 Chinese and 33 Indians
- High-level AEP Corporate and U.S. Government Participation
- Two Technology Tracks
 - Existing Plants – discussed best practices for efficiency and O&M at two AEP power plants
 - Advanced Power Generation
 - discussed AEP's plans for new ultrasupercritical p.c. and IGCC power plants
 - visited DOE's/Southern Company's Power System Development Facility and 260-MW Tampa Electric Polk IGCC Plant
 - met with all major IGCC technology providers (GE, GTI/Synthesis Energy, Shell, and Siemens)
- Great start that generated substantial follow-up interest and laid groundwork for Peer Reviews



Power Generation Best Practices (PGT-06-01)

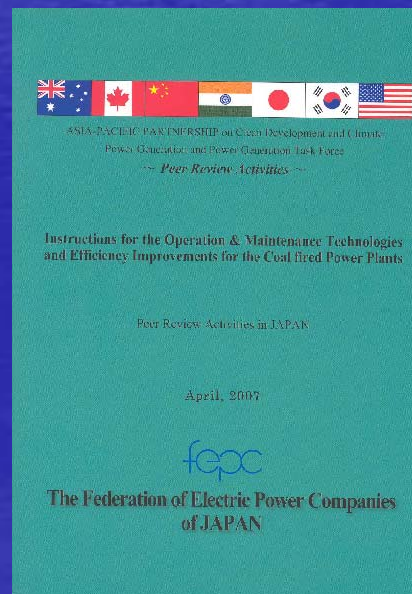
Japanese Peer Review

- **Japan proposed to lead, with U.S. support from the Edison Electric Institute, a series of peer reviews for existing coal-fired plants**
 - Open discussions among plant engineers on best practices for power plant efficiency and O&M
 - Development of efficiency improvement check list
 - Development of power plant design and operations handbook (“Green Book”) for wider dissemination of accumulated knowledge
- **Initial review hosted by Japan’s Ministry of Economy, Trade and Industry (METI) and Federation of Electric Power Companies**
 - About 50 participants, mostly plant engineers, from over 40 different organizations from all 6 inaugural APP countries during 16-19 April 2007

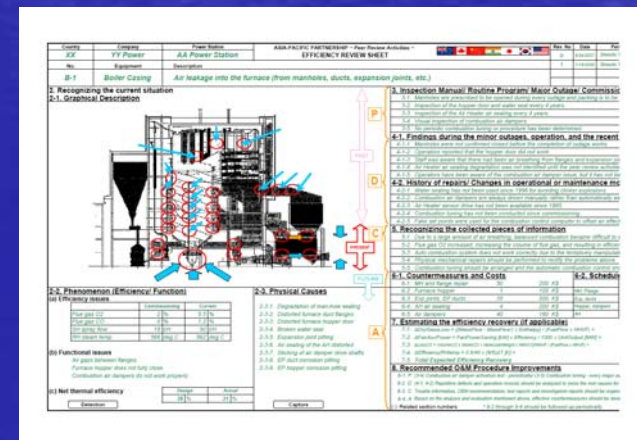
Power Generation Best Practices (PGT-06-01)

Japanese Peer Review

- Format:
 - “Classroom” discussions
 - Power plant visits (3)
- Reviewed and discussed plant operation management, turbine maintenance, boiler water chemistry, environmental protection, and ash recycling
- Developed initial efficiency review sheet and improvement checklist



FEPC's "Green Book"



FEPC's Efficiency Review Sheet

Power Generation Best Practices (PGT-06-01)

Indian Peer Review

- Organized by MoP and NTPC in February 2008
- Participation by 150 mainly power plant engineers and management from 6 inaugural APP countries
- Visits to:
 - NTPC's National Capital Thermal Power Project at Dadri
 - Rajasthan's Kota Thermal Power Station
- Reviewed operations using checklist developed during Japanese Peer Review
- Identified opportunities for efficiency improvement



NTPC's Dadri
Power Plant



Opening Session of Indian Peer Review

Power Generation Best Practices (PGT-06-01)

U.S. Peer Review

- Hosted by Alliant Energy Corporation during 28 April to 2 May 2008
- Organized with support from Edison Electric Institute
- 90 participants from China (2), Japan (30), India (6), Korea (9), and USA (43)
- Visits to 2 Alliant power stations:
 - Edgewater: 70-MW & 340-MW cyclone-fired boilers, and 400-MW pulverized-coal wall-fired boiler
 - Columbia: two 500-MW pulverized-coal tangential-fired boilers
- Reviewed operations using checklist



Alliant's Columbia Station



Checklist Review



Alliant's Edgewater Station

Power Generation Best Practices (PGT-06-01)

U.S. Peer Review

- Presentations on number of advanced technologies:
 - applications of neural networks to Distributed Control Systems (DCS)
 - combustion optimization utilizing data mining techniques
 - computational fluid dynamics (CFD) boiler modeling to optimize over-fired air system design as part of emissions control system
 - mercury reduction using carbon injection
 - computerized maintenance planning program and cost tracking
 - case study of condenser air in-leakage
- Pat Hartley, Edgewater Plant Manager:
 - *“These are some very intelligent, inquisitive people that are very technically adept. Their questions require a lot of thought, and many times research.”*
 - *“...it was a pleasure for me to let people see how older equipment like ours can be maintained, improved, and operated to compete effectively with the newer equipment available.”*

Power Generation Best Practices (PGT-06-01)

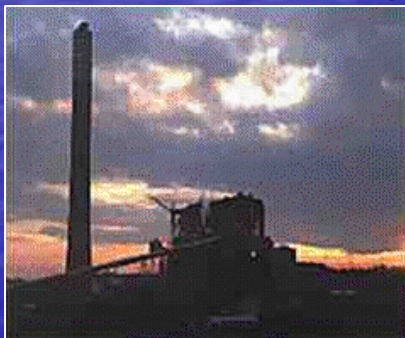
Australian Brown Coal Peer Review

- Hosted by Department of Resources, Energy, and Tourism and National Generators Forum (NGF) in Melbourne during 23-27 June 2008
- Visit Loy Yang and Hazelwood power plants in Latrobe Valley
- Goals:
 - Build on experiences and lessons from previous site visits by improving checklist, but focus on brown coal
 - Provide forum to openly discuss unique challenges to brown coal efficiency improvements and opportunities to reduce overall emissions
 - Provide forum to exchange information on technology and/or process enhancements to increase efficiency of brown coal power generation

Power Generation Best Practices (PGT-06-01)

Indian SEB Coal-Fired Plant Efficiency Improvement

- Build upon 12 years of technical assistance under USAID's Greenhouse Gas Pollution Prevention Project to improve performance of Indian coal power plants
 - With NTPC, established Centre for Power Efficiency & Environmental Protection (CenPEEP) and two regional CenPEEPs
 - Provided basic power plant diagnostic equipment
 - 20+ visits by U.S. experts conducting 200+ demonstrations and providing 7,700+ man days of training
 - CENPEEP conducted over 125 workshops, 14,000 man days of training and 319 hands-on demonstrations
 - Conservatively avoided total of ~75 million tons of CO₂



NTPC's 1000-MW
Rihand Power Plant

NTPC's 2000-MW
Singrauli Power Station



Power Generation Best Practices (PGT-06-01)

Indian SEB Coal-Fired Plant Efficiency Improvement

- Extend NTPC/CenPEEP's know-how and successes to poor performing plants operated by State Electricity Boards
 - Two SEB coal plants selected (Kolaghat in West Bengal and Ropar in Punjab)
 - Provide test & diagnostic equipment to both CenPEEP and SEBs
 - Benchmark, recommend improvements, and train SEB engineers
 - SEB/CenPEEP engineers visit U.S. power plants to observe efficiency improvement activities and best practices
 - Recommend best practices and tools to sustain efficiency gains
 - First U.S. Expert Team Visit:
 - Identified potential to regain 3-5% efficiency improvement & lost 30 MW's at Kolaghat and several percentage points at Ropar
 - Report on recommendations to be issued soon

Power Generation Best Practices

Application of Plasma Ignition Technology in Power Generation (PGT-06-12)

- Guodian Kehuan has nearly 400 installations in China, mostly 300- and 600-MW units firing variety of coals
 - 1st foreign sale to Korea's 560-MW Samchonpo Power Plant
- Visits by NTPC (India) during January 2007 and by Guodian to Alliant in May 2008 following U.S. Peer Review
- U.S. supported project
 - Evaluate commercial plasma igniter technology for application in U.S. coal-fired power plants
 - Detailed questionnaire sent to China Guodian
 - Visit ignitor manufacturing facility and 2 Chinese power plants with plasma igniters (April 2008)
- Compare technology with conventional ignition technology for both new and retrofit applications
- Estimate potential energy and economic savings, and emissions reductions in U.S. coal-fired power plants

Power Generation Best Practices (PGT-06-01)

IEA/G8 Gleneagles Plan of Action

- IEA effort to assess opportunities to improve efficiency of existing coal-fired power plants worldwide
 - Globally 1.35 - 1.7 billion ton/yr of CO₂ reduction feasible by moving to state-of-the-art pc plants
 - Reduce coal consumption by ~0.5 billion tons/yr
 - Completed report on case studies of recently completed plants
 - Adding efficiency estimates for all coal-fired power plants to IEA Clean Coal Centre's existing CoalPower database
 - Preparing report on coal-based power generation: potential of future developments and outlook

Power Generation Best Practices (PGT-06-01)

IEA/G8 Gleneagles Plan of Action

- Audit several coal-fired power plants in China
- Support from USDOE/NETL, Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH, U.K. Foreign and Commonwealth Office - Strategic Programme Fund, and Monash University (Australia)
- **Coordination by China Electricity Council**
 - China Guodian's Jingmen Power Plant (Unit 4 and 5) in Hubei Province
 - China Power Investment Corporation's Fushun Power Plant (Unit 1) in Liaoning Province
- **U.S. and European experts to review all major plant components to validate estimates and identify efficiency improvement opportunities**
- **Report on plant audit findings and conduct several regional workshops**

Power Generation Best Practices (PGT-06-01)

Quantification of CO₂ Emissions Reduction

- USDOE to support Abatement Solutions (Australia) and Science Application International (SAIC/USA) to develop simplified power plant efficiency/CO₂ quantification methodology
- Japan's Federation of Electric Power Companies developed model to be modified to quantify energy savings/CO₂ emission reduction through efficiency gains and/or avoiding efficiency degradation by O&M improvement at national level
 - Project team to discuss methodology, review assumptions, and verify country data to generate reliable estimates
 - Team may explore technology road mapping and potential benefit of application of advanced technologies

Power Generation Best Practices (PGT-06-01)

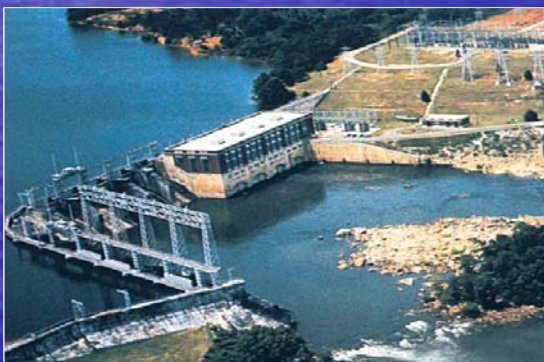
Wind Electric Generation

- Initial information exchange from differing perspectives of purchaser, operator/developer, and integrated system operator
- Scheduled 4-8 August 2008 in San Francisco, CA
- 40-50 expected participants from all APP nations
- Hosted by PG&E and FPL in cooperation with Edison Electric Institute
- Jointly with Renewables and Distributed Generation Task Force



Power Generation Best Practices

Hydroelectric Generation Best Practices (PGT-06-06)



- Duke Energy and First Energy led event held August 2007 with coordination by Edison Electric Institute
- 50+ participants from China, India, Japan, Korea, and USA
- Visited Conventional and Pumped Storage Facilities in North Carolina, South Carolina, and New Jersey

Duke Energy's 17-MW Wylie Hydro Plant

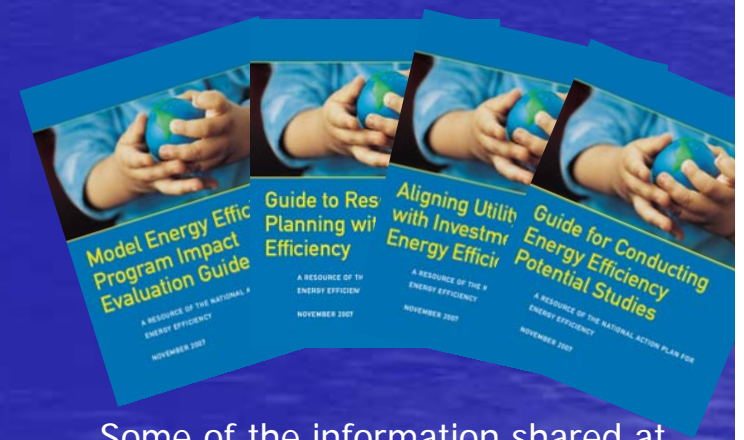
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Review of Demand Side Management
Best Practice Activities

DSM Best Practices (PGT-06-03)

Promoting Clean Energy Options in the Electricity Supply and Demand Sector in India

- Lawrence Berkley National Laboratory led activity
 - Use lessons learned from USA, especially California, to explore approaches to overcome institutional, regulatory, and procedural barriers to energy efficiency in India
 - Begin in Maharashtra as it seeks assistance on most productive ways to utilize about \$15 million of public benefits charge funds
 - Training workshop at Tata Power Company, 14-18 March 2008
 - Provide technical assistance and training to electricity regulatory commissions, public and private utility companies, consumers, and equipment manufacturers
 - Target investments in appropriate supply and demand side options
 - Design, implement, monitor, and evaluate DSM policies and programs



Some of the information shared at Mumbai Workshop

APP PG&T Task Force

Review of Information Sharing
Consistent with Clean Development
and Climate Change

Information Sharing Energy Regulatory and Market Development Forum (PGT-06-03)

- Objective: foster and facilitate exchange and sharing of information and experience on regulatory policy and practice relating to the operation of energy industries and markets (electricity and gas)
- Australian Chair Commissioner Ian Woodward visited APP countries in early 2007 to begin discussions and receive feedback on proposed terms of reference
- First meeting of Forum Steering Committee was held 30-31 August 2007 in Queensland, Australia
- Steering Committee agreed on a 2-year work plan, focused on:
 - Clean Energy Development
 - Energy Infrastructure and Market Regulatory Arrangements
 - Reliability and Energy Security
- Forum will meet 25-27 June 2008 in Sydney, Australia, with expected attendance of around 200