

# Best Management Practices in Sustainable Energy Management



# Background on MWH

- Global, full-service provider of consulting, engineering, construction and management services in water, natural resources, and infrastructure sectors
- 7,000 professionals
- Located in 35 countries in 170 Offices
- Corporately is committed to practices that are economically, environmentally and socially sustainable

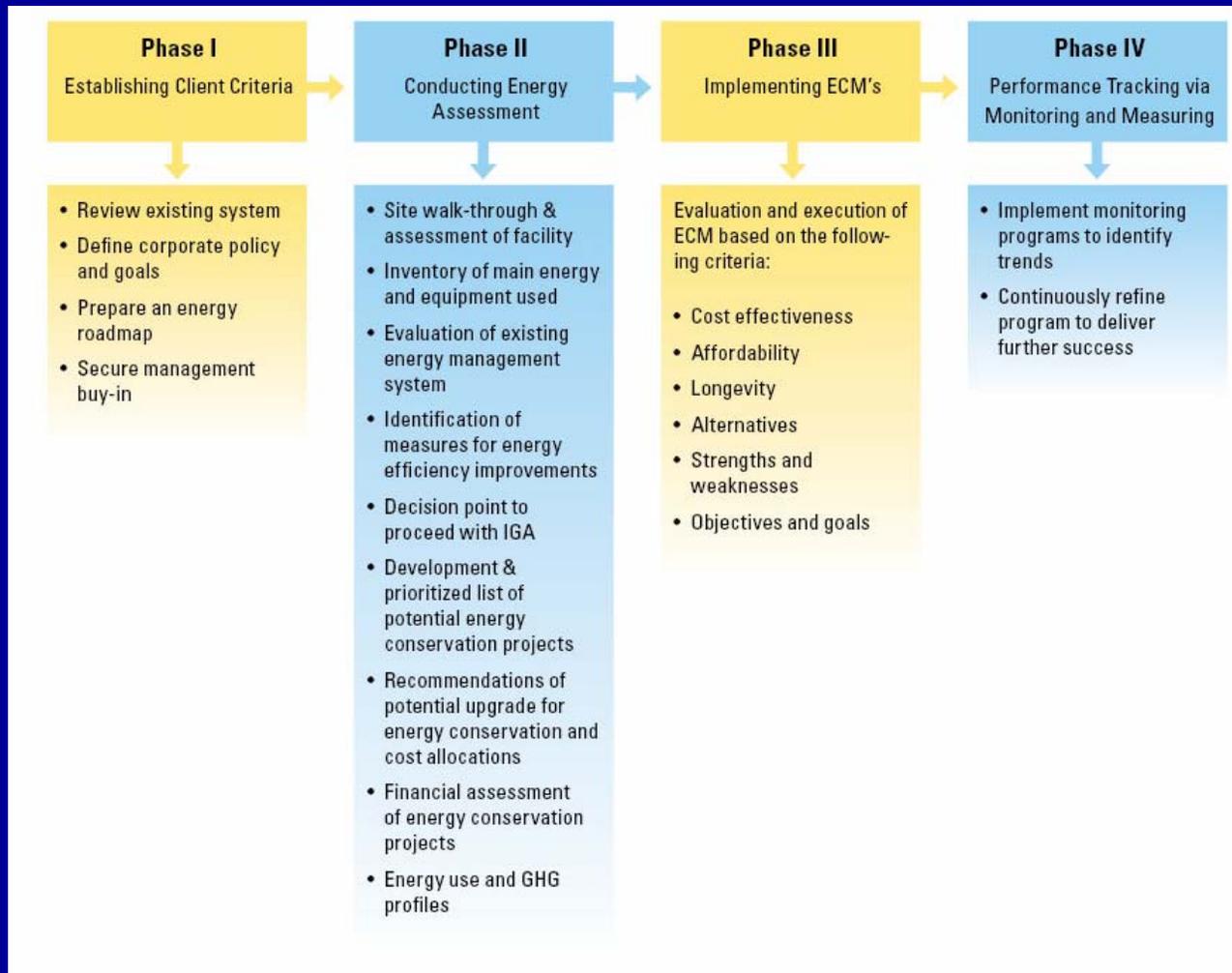
# MWH Carbon Emissions Strategies

- MWH measured and devised strategies to cut our own carbon emissions by as much as 10-15 percent
- Examples include:
  - Investing \$1.5M capital to improve our video conferencing capabilities to reduce air travel
  - Replacing our fleet of conventional vehicles with fuel-efficient hybrids
  - Requiring newly leased office spaces to be certified under green building codes

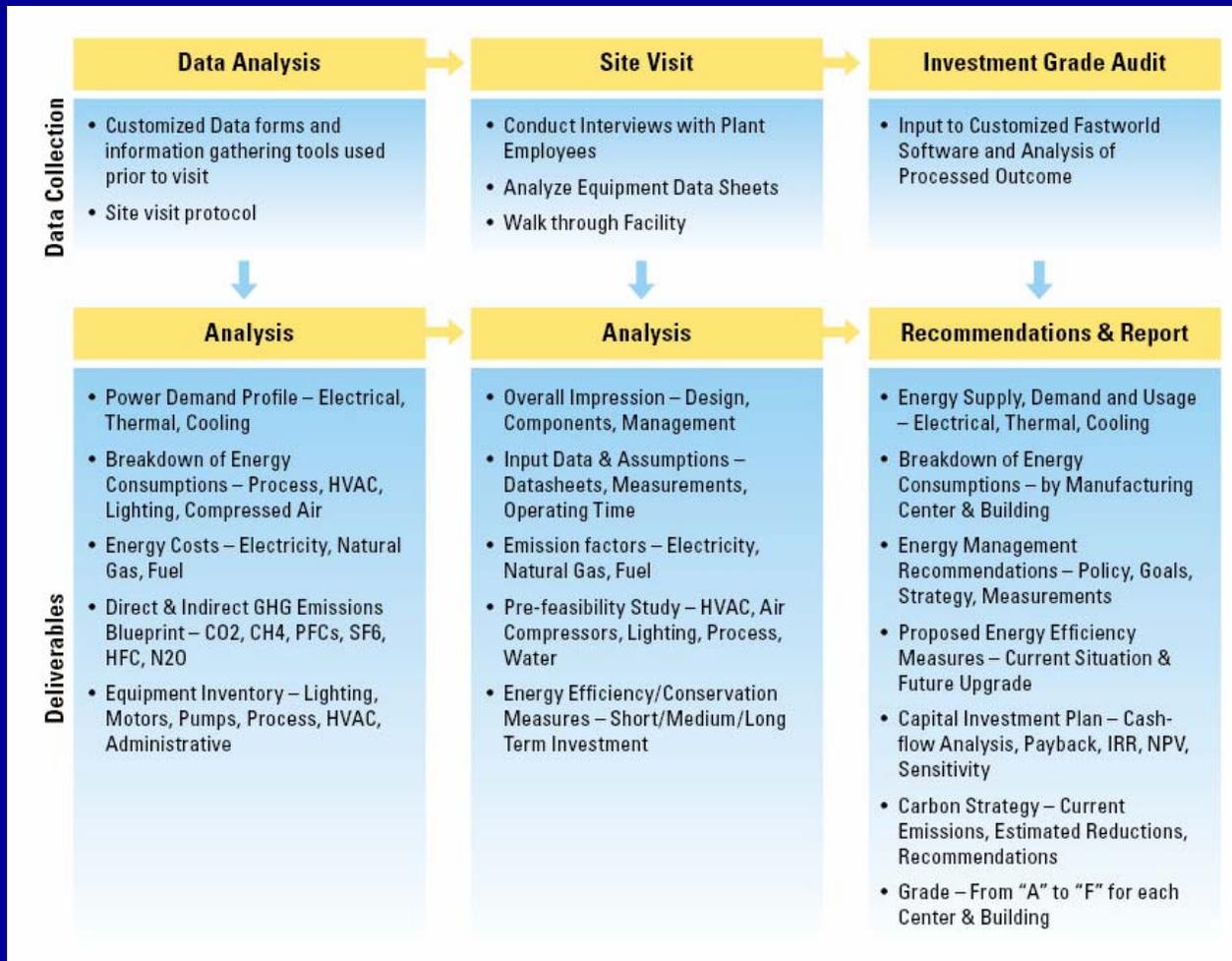
# Twin Pillars of Sustainable Energy Management



# Four Phases of Energy Management Program Development



# Energy Assessment and Comprehensive Study



# Potential Energy Conservation Measures

**Wide range from no or low cost to projects requiring significant capital expenditures**

- **Good housekeeping:**  
'shut-it-off', planning, maintenance, regular inspection (compressed air network, steam traps, air excess of boilers), etc.
- **Process control improvement:**  
review of set points, installation of variable speed drives, O<sub>2</sub> trimming on steam boilers, etc.
- **Detailed design improvement:**  
upgrading insulation of the steam distribution network, downsizing pumps, etc.
- **Changes in the conceptual design of a process:**  
installation of an economizer/condenser on a boiler, etc.
- **Integration, cogeneration and renewable energy production:**  
recover waste heat in another process (e.g. by installing a hot water circuit), installation of small to medium sized CHP, development of waste-to-energy projects, etc.

# Implementing Energy Conservation Measures (ECM)

- Implement ECM's and/or equipment upgrades
- Actual installation can be based on many factors, including
  - cost effectiveness
  - affordability
  - longevity
  - other, wider business considerations

# Implementing Energy Conservation Measures (ECM)

## Results of a typical assessment (fine chemicals sector)

- In the first round assessment, energy savings amounted to 20% (monitored and corrected for production increases), mainly by means of 'easy wins' (good housekeeping, process control improvement, etc.)
- In the second round assessment, another 5-15% energy savings were identified, however requiring more significant investments (small-scale CHP, etc.)

# Performance Tracking via Monitoring and Measuring

- Energy Management Program should include a monitoring and measurement program to track ECM performance
- Adjustments being made as needed

# Results of this Approach

Client	Location	Project Type	Results
<b>Energy Management</b>			
Oto Melara	La Spezia, Italy	Energy efficiency assessment at an aircraft system factory	Reduced electrical consumption by 5,000 MWh. Eliminated 2,700 metric tons of CO <sub>2</sub>
Aventis	New Jersey, US	Energy efficiency assessment and feasibility study at a pharmaceutical R&D center	Reduced electric consumption by 6,000 and \$400K annually
Galileo Avionica	Florence, Italy	Energy efficiency assessment at an electronic defense factory	Reduced electrical consumption by 1,200 MWh and thermal consumption by 700 MWh. Eliminated 700 metric tons of CO <sub>2</sub>
Selex SI	Rome, Italy	Energy efficiency assessment at a systems for defense factory	Reduced electrical consumption by 6,500 MWh and thermal consumption by 7,200 MWh. Eliminated 4,900 metric tons of CO <sub>2</sub>
Procter & Gamble	Latina, Italy	Energy efficiency assessment at a chemical products factory	Reduced electrical consumption by 9,500 MWh and thermal consumption by 9,800 MWh. Eliminated 2,800 metric tons of CO <sub>2</sub>
AnsaldoEnergia	Genove, Italy	Energy efficiency assessment at a thermo power plant factory	Reduced electrical consumption by 4,100 MWh. Eliminated 2,200 metric tons of CO <sub>2</sub>
EBRD – KTP	Kharkiv, Ukraine	Energy efficiency assessment at a tile plant	Reduced electrical consumption by 25,000 MWh. Eliminated 17,000 metric tons of CO <sub>2</sub>

# Results of this Approach

Client	Location	Project Type	Results
<b>Renewable Energy</b>			
Microgy, Inc.	Texas, US	Design build two renewable biogas energy facilities	Produces clean renewable gas from cow manure and food industry waste. The biogas is then sold.
United Nations Development Program	India	Development of a National Master Plan for implementing cost-effective waste to energy projects over the next 15-20 years	Optimized bio-energy recovery and efficient power projection
Metropolitan Water District of Southern California	California, US	Developed design drawings and performance type specifications for a 1 MW AC photovoltaic single axis tracking system	Allowed MWD to meet state goals for renewable energy generation and lower water treatment plant power consumption
ASVIN – EC Funded	India	Developed pilot study to disseminate decentralized solar energy systems	Supply remote Himalayan villages with energy and improving their quality of life
Cities of Fairfield and Vacaville	California, US	North Bay Regional Water Treatment Plan Renewable Energy Study	Projected solar and wind plants will produce 1 MWh taking maximum advantage of the state funding available
North Slope Borough	New York, US	Barrow landfill closure plan looking to recover recyclable materials	30 million tons of material will be recovered and recycled saving \$1.5M
Federal Aviation Administration	Alaska, US	Alternative energy project with integration of wind generation and solar panels	Reduced fuel consumption by 80%
MWC/Boral	Connecticut, US	Design/build of gas turbines and HSRGs and steam turbines	Provides 250MWh to the Connecticut power grid
Sustainability Victoria/ MWC	Australia	Life cycle analysis of biosolids including use as a renewable fuel	Reduced fossil fuel usage and eliminating 10% of CO <sub>2</sub> emissions