



“QUALITY” Operation & Maintenance for APEC Guideline

- Importance of O&M Know-how -



Tokyo Electric Power Company – Fuel & Power Company

APEC Workshop

25 Aug 2015

TEPCO is Japan's largest utility, supplying power to the Tokyo metropolitan area for over 60 years



TEPCO Holdings

- Established in 1951
- Function: Electric utility
- Capacity: 65.0 GW in Japan (Thermal, Nuclear, Hydro)
- Employees: 35,000 (holdings)
- Assets: \$150 billion¹



Fuel & Power Company (FPC)

- Function: Thermal generation
- Capacity: 43.3 GW in Japan
- Employees: 3,000
- Assets: \$15 billion



Power Grid Company (PGC)

- Function: Transmission and distribution
- Employees: 15,000
- Assets: \$55 billion

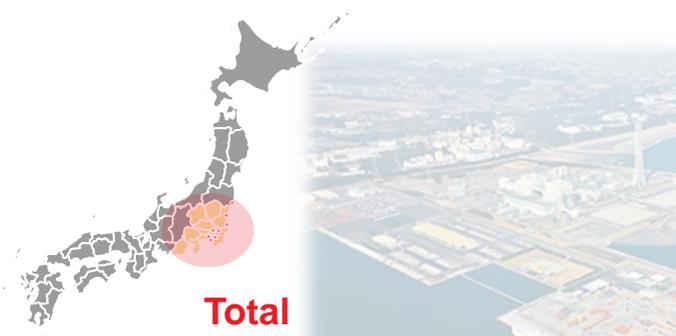


Customer Service Company (CSC)

- Function: Power retailing
- Employees: 7,000
- Assets: \$20 million

TEPCO runs power plants of various fleet types with large capacity

Japan



Global



| Fleet | Units | Total capacity | | OEM |
|--------------------|-----------|----------------|---------------|---|
| | | MW | TWh | |
| Coal | 4 | 3,200 | | <ul style="list-style-type: none"> ▪ MHPS ▪ MHI ▪ Hitachi ▪ Toshiba ▪ GE ▪ IHI ▪ MELCO ▪ Fuji |
| CC GT | 1500°C | 10 | 5,021 | |
| | 1300°C | 26 | 9,600 | |
| | 1100°C | 14 | 2,000 | |
| Gas (Conventional) | 23 | 12,761 | | |
| Oil (Conventional) | 19 | 10,750 | | |
| Total | 96 | 43,332 | ~211.6 | |

| Investment in power plant SPC | | | |
|-------------------------------|--------------------------|-------------------|-------------------------|
| Fleet | Plant name | Total capacity MW | Ownership ratio Percent |
| Gas | Chinese Taipei Star Buck | 490 | 22.7 |
| | UAE Umm Al Nar | 2,200 | 20.0 |
| | Vietnam Phu My 2-2 | 715 | 15.6 |
| | Chinese Taipei Fong Der | 980 | 19.5 |
| | Chinese Taipei Chang Bin | 490 | 19.5 |
| Coal | Indonesia Paiton III | 815 | 14.0 |
| | Indonesia Paiton I | 1,230 | 14.0 |
| Total | | 6,920 | |

Power generation corporation investment

| | | | |
|-----------------|---|--------------|------|
| Thailand |  | 5,150 | 12.3 |
| The Philippines |  | 3,204 | 50.0 |
| Total | | 8,354 | |

TEPCO has been maximizing power plant performance with cutting-edge technologies and hardware...

Highest thermal efficiency, %

39.4

47.2

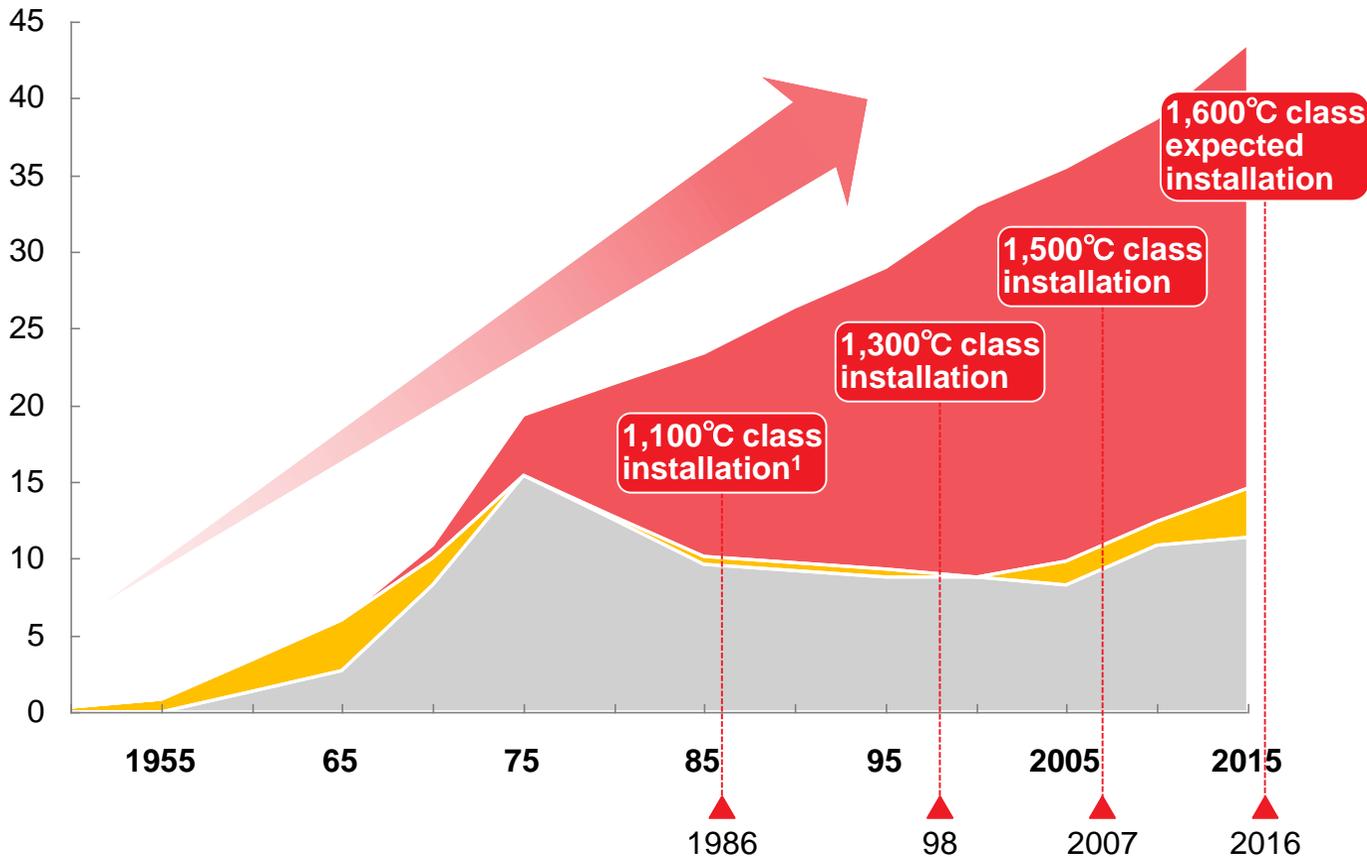
54.1

58.6

60+

One of the world's highest thermal efficiency

TEPCO thermal power capacity GW

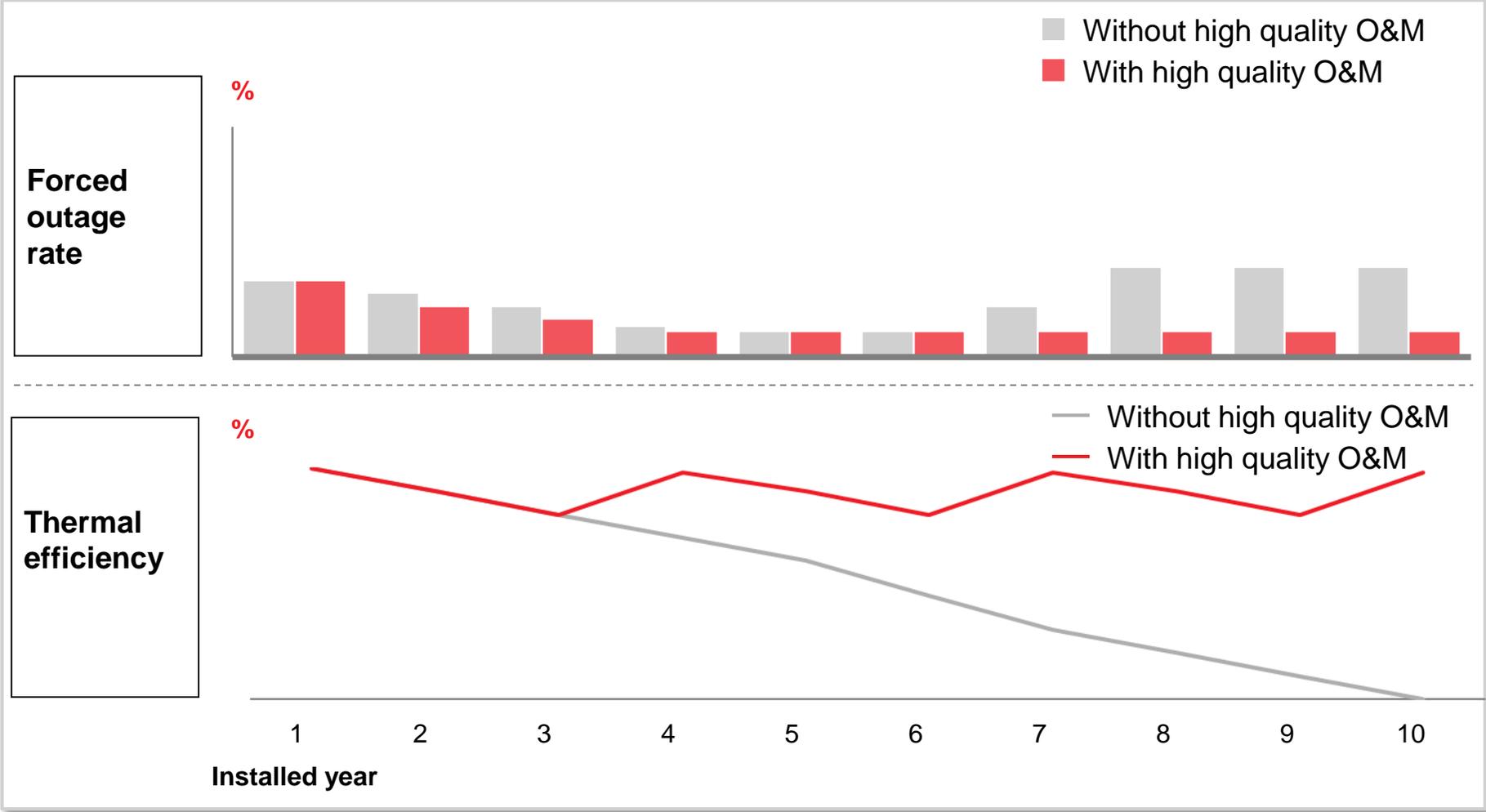


- Gas 
- Coal 
- Oil 

¹ 1 GT inlet gas temperature

However, not only hardware but also Operation & Maintenance is critical in world - class power plant management

ILLUSTRATIVE



“Quality” Operation & Maintenance consists of 7 key elements

THE WORLD CLASS POWER PLANT MANAGEMENT

i Preventive maintenance & trouble shooting 

- 24 hours real-time monitoring with a wealth of operational and maintenance data gathered over 20 years
- On-the-ground troubleshooting by frontline TEPCO professional operators with the help of specialized analytical and engineering teams

ii Maximized thermal efficiency 

- Equipment diagnosis and data analytics
- Remote monitoring system to track and optimize thermal efficiency
- Optimal equipment maintenance and replacement

iii Environment/ Public acceptance 

- Advanced CO₂ emission management and environment-friendly operation know-how
- Know-how to realize strong relationships with local communities

iv Maintenance plan for optimized LCC 

- Comprehensive optimized maintenance planning and scheduling to minimize LCC, instead of frequent replacement of equipment

v



Talent management and governance

vi



Optimized procurement

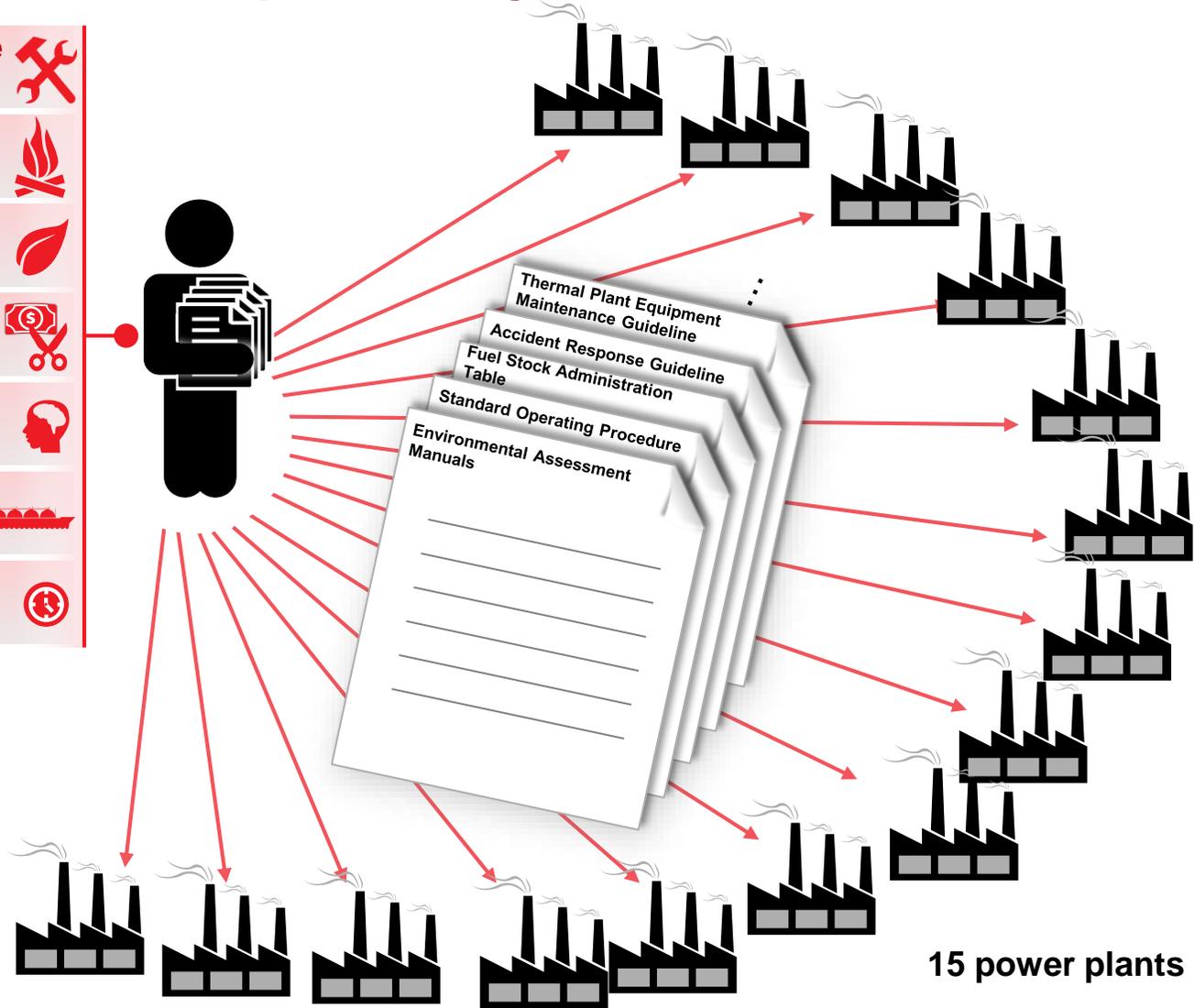
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Strategy for efficient power plant operations

TEPCO incorporates the 7 key elements into standardized manuals to maintain world-class plant management

- i** Preventive maintenance and trouble shooting 
- ii** Maximized thermal efficiency 
- iii** Environment/ Public acceptance 
- iv** Maintenance plan for optimized LCC 
- v** Talent management and governance 
- vi** Optimized procurement 
- vii** Strategy for efficient power plant operations 





Infrastructure quality guidelines for
**APEC shall incorporate
Operation & Maintenance elements**
in addition to hardware quality and other
"hard" factors