Guaranteed Energy Savings Performance Contracting in the Public Sector

Energy Efficiency & Conservation Department
National Environment Agency
Issues with typical 1-for-1 equipment replacement
Common concerns raised by building owners

Contractors put in minimum efforts to improve energy efficiency; building owners find it difficult to stipulate EE performance in contracts.

Existing systems are typically oversized; 1-for-1 replacement leads to wasteful capital investment and poor system performance.

No sole party responsible to guarantee the outcome (leading to finger-pointing between designer and contractor).
Guaranteed Energy Savings Performance (GESP) Contract
What is a GESP?

A Guaranteed Energy Savings Performance (GESP) contract is a turnkey contract where an accredited Energy Services Company (ESCO) will:

- Carry out an Investment Grade Energy Audit
- Recommend Energy Conservation Measures (ECMs) (e.g. chiller plant retrofit)
- Develop Phase II contract
- Implement Energy Conservation Measures
- Guarantee efficiency / annual savings over contract term (typically 5 years)

**Phase I**
- Better accountability as one party is responsible from beginning to end
- Reduce wasteful capital investment by right-sizing and redesigning plant with proper measurement & verification system
- Greater certainty to achieve ≤0.65kW/RT (GM platinum standard) over contract term

**Phase II**
### How Does a GESP Contract Work?

<table>
<thead>
<tr>
<th><strong>Client’s investment</strong></th>
<th><strong>ESCO’s Obligations</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>Consultancy Fee (for Phase I)</strong></td>
<td>Guarantee chilled water plant or air-conditioning system efficiency ($kW_E/kW_T$)</td>
</tr>
<tr>
<td>Fee for ESCO to:</td>
<td>Guarantee annual savings (S$)</td>
</tr>
<tr>
<td>• Conduct Investment Grade Energy Audit</td>
<td>For other energy intensive equipment</td>
</tr>
<tr>
<td>• Develop Phase II Contract</td>
<td><strong>Provide maintenance for all equipment</strong></td>
</tr>
<tr>
<td><strong>Contract Price (for Phase II)</strong></td>
<td>• Comprehensive - new equipment</td>
</tr>
<tr>
<td>• Total implementation cost</td>
<td>• Preventive - existing equipment</td>
</tr>
<tr>
<td>• Maintenance over the contract term period</td>
<td><strong>Repay lost savings if energy performance is not achieved</strong></td>
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<td></td>
<td>“Make-good” to achieve guaranteed performance, else repay full amount of lost savings at end of term</td>
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</table>
GESP Contracting Model  Phase I

GESP Tender & Evaluation

Level 3 Investment Grade Audit

Yes

Guaranteed eff. can be achieved?

Payment of 50% Consultancy Fee

No

Project terminates

Yes

Development of Phase II Contract and payment of remaining 50% Consultancy Fee

No

Client decides whether to enter Phase II

Project terminates

Penalty of 5% Consultancy Fee paid by ESCO

Proceed to Phase II
GESP Contracting Model

Phase II

- Implement Energy Conservation Measures
- Testing & Commissioning
- 5-year Guarantee of Efficiency
- Maintenance of equipment
- Annual M&V report
<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
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</table>
| ![Disk](image) | Permanent instrumentation installed onsite  
• Data captured at one minute intervals  
• Stored to disk for 3 years |
| ![Flow](image) | Full-bore magnetic flow meters  
High accuracy temperature measurements  
(end-to-end ±0.03 °C error) |
| ![Graph](image) | Continuous monitoring of heat balance with at least 80% of data points within ±5% |
| ![Thermometer](image) | Additional thermowells to check temperature readings  
Weather station (at least 2 for large plants) |
| ![Computer](image) | Man-machine interface that allows multiple variable trending on the same display |
Inclusion of Green Mark Certification in GESP projects

Phase I

- Carry out an Investment Grade Energy Audit
- Recommend Energy Conservation Measures (ECMs) (e.g. chiller plant retrofit)
- Green Mark Gap Analysis
- Recommend measures to reach GM target

Phase II

- Develop Phase II contract
- Implement ECMs
- Guarantee efficiency / annual savings over the term of contract (typically 5 years)
- Client to implement recommended measures for Green Mark
- Green Mark Certification

Client to implement recommended measures for Green Mark
Key benefits of GESP

**Accountability**
by a single contractor (ESCO)

**GM Platinum**
Guarantee of efficiency better than 0.65 kW/ton

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**Emphasis on good M & V**

- Placement of flow meters to ensure sufficient straight pipe length
- Consistency checks (individual and header data)
- Accuracy checks for temp readings (with accurate sensor by BCA)
- Checks on calibration certificates of sensors to ensure traceability

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**Close review of key design considerations**

- Chiller plant design, esp. piping
- BMS graphics and user-interface
Our Environment

Safeguard • Nurture • Cherish