Guaranteed Energy Savings Performance (GESP) Contracting Model in the Public Sector
Issues with typical 1-for-1 replacement

Guaranteed Energy Savings Performance (GESP) Contracting Model

Public Sector GESP Projects
Issues with typical 1-for-1 equipment replacement
Key issues in 1-for-1 replacement

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

No assurance of improved energy performance after retrofits; performance of new equipment is not verified and tracked over the long term

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

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

1. Carry out an Investment Grade Energy Audit
2. Recommend Energy Conservation Measures (ECMs) (e.g. chiller plant retrofit)
3. Implement ECMs
4. Guarantee chiller plant efficiency / annual savings

**Phase 1**
- Redesign of chiller plant to meet the guaranteed efficiency (<0.65kW/RT)
- Greater certainty on system performance over the contract period
- One sole party – the awarded ESCO - responsible from the beginning to end

**Phase 2**
- Over the term of contract: usually 5 years
What is a GESP contract?

<table>
<thead>
<tr>
<th>Client’s investment</th>
<th>ESCO’s Offer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Consultancy Fee (i.e. Phase 1 cost)</strong></td>
<td>Guaranteed air-conditioning system specific consumption i.e. efficiency (kWE/kWT) or (kW/RT)</td>
</tr>
<tr>
<td>• Investment Grade Energy Audit</td>
<td>For air-conditioning system retrofit only</td>
</tr>
<tr>
<td>• GESP Contract development</td>
<td><strong>Annual Guaranteed Savings (S$)</strong></td>
</tr>
<tr>
<td><strong>Contract Price (i.e. Phase 2 cost)</strong></td>
<td>For other energy intensive equipment such as lighting and mechanical ventilation</td>
</tr>
<tr>
<td>• Total implementation cost</td>
<td></td>
</tr>
<tr>
<td>• Maintenance over the contract term period</td>
<td></td>
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</tbody>
</table>
GESP Contracting Model

**Phase 1**

1. **GESP Tender & Evaluation**
2. **Level 3 Investment Grade Audit**
   - **Yes**
     - Guaranteed eff. can be achieved?
       - **Yes**
         - Development of Phase 2 Contract and payment of remaining 50% Consultancy Fee
         - **Proceed to Phase 2**
       - **No**
         - Project terminates
9. ESCO is NOT entitled to any payment

- **No**
  - Project terminates

Client decides whether to enter Phase 2

- **Yes**
  - Development of Phase 2 Contract and payment of remaining 50% Consultancy Fee
  - **Proceed to Phase 2**
- **No**
  - Project terminates
GESP Contracting Model

**Phase 2**

- Implement Energy Conservation Measures
- Testing & Commissioning

- 5-year Guarantee of Efficiency
- Maintenance of equipment
- Annual M&V report
Contractor’s obligations

**Throughout the term (typically 5 years)**

1. Guarantee system efficiency and savings (0.65 kW/RT or better)

2. Provide comprehensive maintenance for all new equipment
   - Provide preventive maintenance for existing equipment

3. Repay lost savings if energy performance is not achieved

**At the end of the term**

4. “Make-good” to achieve guaranteed performance, else repay full amount of lost savings (up to the 10th year) at end of term
Measurement and Verification

- Fully instrumented plant
  - Data captured at one minute intervals
  - Stored to disk for 3 years

- Full-bore magnetic flow meters
  - High accuracy temperature measurements
    (end-to-end ±0.03 °C error)

- Continuous monitoring of heat balance with at least 80% of data points within ±5%

- Additional thermowells to check temperature readings
  - Weather station (at least 2 for large plants)

- Man-machine interface that allows multiple variable trending on the same display
Key benefits of GESP

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

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

**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

**Close review of key design considerations**

- Chiller plant design, esp. piping
- BMS graphics and user-interface
Public Sector GESP Projects
Public Sector GESP Projects

- Average chilled-water plant efficiency (kW/RT)
- Annual electricity consumption by the chilled-water plant (kWh)

### Pre-retrofit consumption
- A: 14000000 kWh
- B: 12000000 kWh
- C: 10000000 kWh
- D: 8000000 kWh
- E: 6000000 kWh
- F: 4000000 kWh
- G: 2000000 kWh
- H: 1000000 kWh
- I: 5000000 kWh

### Post-retrofit consumption
- A: 14000000 kWh
- B: 12000000 kWh
- C: 10000000 kWh
- D: 8000000 kWh
- E: 6000000 kWh
- F: 4000000 kWh
- G: 2000000 kWh
- H: 1000000 kWh
- I: 5000000 kWh

### Pre-retrofit efficiency
- A: 53%
- B: 56%
- C: 56%
- D: 66%
- E: 50%
- F: 51%
- G: 29%
- H: 43%
- I: 75%

### Post-retrofit efficiency
- A: 53%
- B: 56%
- C: 56%
- D: 66%
- E: 50%
- F: 51%
- G: 29%
- H: 43%
- I: 75%
Our Environment

Safeguard • Nurture • Cherish