Practical introduction of EHP and its related issues

To promote effective and efficient technology transfer of Japanese low-carbon technologies to India

~ The case of EHPs (Electric Heat Pumps) ~

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Equipment: Water heat source EcoCute

Water heat source EcoCute recovers heat energy from regular water and cool water at the same time.

The system takes 1 unit of electricity and recovers 4.5 units of heat energy from water to create 5.5 units of hot water (maximum).

- **Selection criteria**
  - Water heat source EcoCute will not operate without a cooling object.
  - Air heat source EcoCute recovers heat energy from ambient air, so there is almost no operational time constraint.

If you need to cool water regularly, → water heat source EcoCute is recommended.
If you do not need to cool water regularly, → air heat source EcoCute is recommended.
Installation at Company M

Purposes:
• Hot water: Feed-water heating to boiler and hot water supply to processes
• Cold water: Process cooling (pre-cooling)

Location: Punjab state (northwest India)
Installation at Company A

Purposes:
• Hot water: Feed-water heating to boiler
• Cold water: Cooling processes (replacing chiller)

Location: Gujarat state (midwest India)
Processes to implementation: Keys to deciding on location (1/2)

◆ From Indian customer’s perspective

| Japan’s advanced technology | Don’t know | Uncertainty (Will it really work? Isn’t it risky?) |

It is important to clear up customer’s doubts about the effectiveness of “advanced technology,” which is untested in the local market: “Will it really work?” and “Isn’t it risky?”

To assure Indian customers:
- How to prove the technology?
- How to illustrate the benefits?
- How to provide the confidence?
Processes to implementation: Keys to deciding on location (2/2)

◆ From Japanese supplier’s perspective

| Indian situation | Don’t know | Uncertainty (Will it really work? Isn’t it risky?) |

It is important to clear up supplier’s concerns about the workability of Japan’s proven technology in a different situation in India: “Will it really work?” and “Isn’t it risky?”

To be ready in Japan:
What can they prepare in India? What can they not prepare in India?

➢ What sort of troubles are expected?
➢ What risk control is needed?
➢ What framework is formed?
Processes to implementation: Before starting

Essential ... Collaboration among partners
(TERI-JICA・JST-IGES-Mayekawa India)

Through the processes, we truly learned that a collaboration among partners with different areas of expertise and network is the key to achieving a new project employing the collective efforts of unconnected parties.
Processes to implementation: What we did

1. PS Survey
   - To gain an understanding and confidence on our proposed technology, we held workshops; through presentations and discussions, we tried to build communication.
   - We visited prospective customers, made preliminary surveys, and studied the feasibilities and issues there.

Through the PS survey, we studied feasibilities in size, usage, temperature, etc.
* The PS survey primarily focused on feasibility, because at the time the project requirements were not yet known; the study for the system configuration and required equipment were limited.
Processes to implementation: What we did

2. DS Survey

- To gain more detailed data required by Japan and India, we installed several sensors on site. We also held meetings more frequently than in the PS survey and discussed with customers to solidify an understanding of the system.
- We surveyed the environment, confirmed the site-specific issues, actions against them, and scope of work to make clear the tasks for installation.

Through the DS Survey, we identified the differences in ambient environment, operating conditions, way of thinking, and cultural gap, in addition to frequent power outages, bad water quality, damage by animals, etc.

* The DS survey focused on the detailed study and planning of system design, equipment design, work schedule, etc. required for the installation.
Processes to implementation: What we did

Specific issues to be addressed

- To complete the processes from installation to operation, especially for a new technology, the following issues should be clearly and amicably agreed with customers.

1. Common understanding about location, layout, and schedule (Must)
   - Prepare the outline in Japan and ensure the implementation in India.

2. Reconfirmation and determination of scope of work
   - Discuss every detail and confirm in writing.

3. Follow-up from installation to operation
   - Monitor progress through photographs and by local staff (TERI).
   - Supervise and look after.
   - Implement trial operation calibration, operational instructions, and operational trainings.
   - Investigate the cause(s) of trouble if any (analyze in Japan, fix in India).
### Processes to implementation: What we did

#### (Example) Scheduling

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Location</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plant design (layout, tank, electricity, construction, material selection)</td>
<td>Designed in India</td>
<td>~25/3/2013</td>
</tr>
<tr>
<td>2</td>
<td>Create various drawings (tank manufacturing, construction, piping, foundation, electricity)</td>
<td>Designed in India</td>
<td>~29/3/2013</td>
</tr>
<tr>
<td>3</td>
<td>Manufacture of hot water tank</td>
<td>Manufactured in India</td>
<td>~26/4/2013</td>
</tr>
<tr>
<td>4</td>
<td>Manufacture of cold water tank</td>
<td>Manufactured in India</td>
<td>~26/4/2013</td>
</tr>
<tr>
<td>5</td>
<td>Construction work (piping, electric)</td>
<td>Arranged in India</td>
<td>~15/4/2013</td>
</tr>
<tr>
<td>6</td>
<td>Shipping</td>
<td>Transportation</td>
<td>~26/5/2013</td>
</tr>
<tr>
<td></td>
<td>Confirmation and verification</td>
<td>After review</td>
<td>After May 27</td>
</tr>
</tbody>
</table>
Processes to implementation: What we did

(Example) Troubleshooting in operation

P-13  Air-bleeding

Remove the thermal insulation under the pump. Open the air-bleeding needle valve, while continuing pump operation. Be careful not to dry run the pump.

Remove the gauge to bleed air, while continuing pump operation. Be careful not to run the pump without water.

Checking the water level of LT-5

Open this valve to draw water into the hose and indicate the actual water level.
Follow-up mission

We reported on the achievement of the pilot project there, the situation before and benefits after installation, to a wide range of business operators. We hope the objective of our mission and the benefits of system implementation were understood by participants.

Meanwhile, we have informed local operators about operational tips to effectively use the equipment. We tried to achieve their full understanding through mutual discussion, because our objective was not just to create a one-shot business but to continue and expand the cooperation.