Department of Industrial and Systems Engineering
DESIGNING AN ENERGY MANAGEMENT SYSTEM @ KEPPEL FELS
IE3100 System Design Project 2008/2009

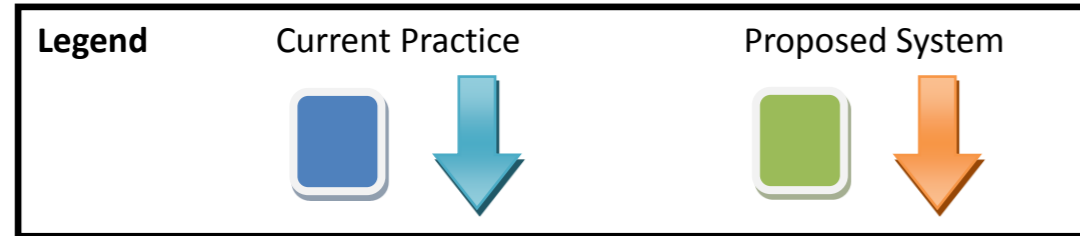NUS National University of Singapore
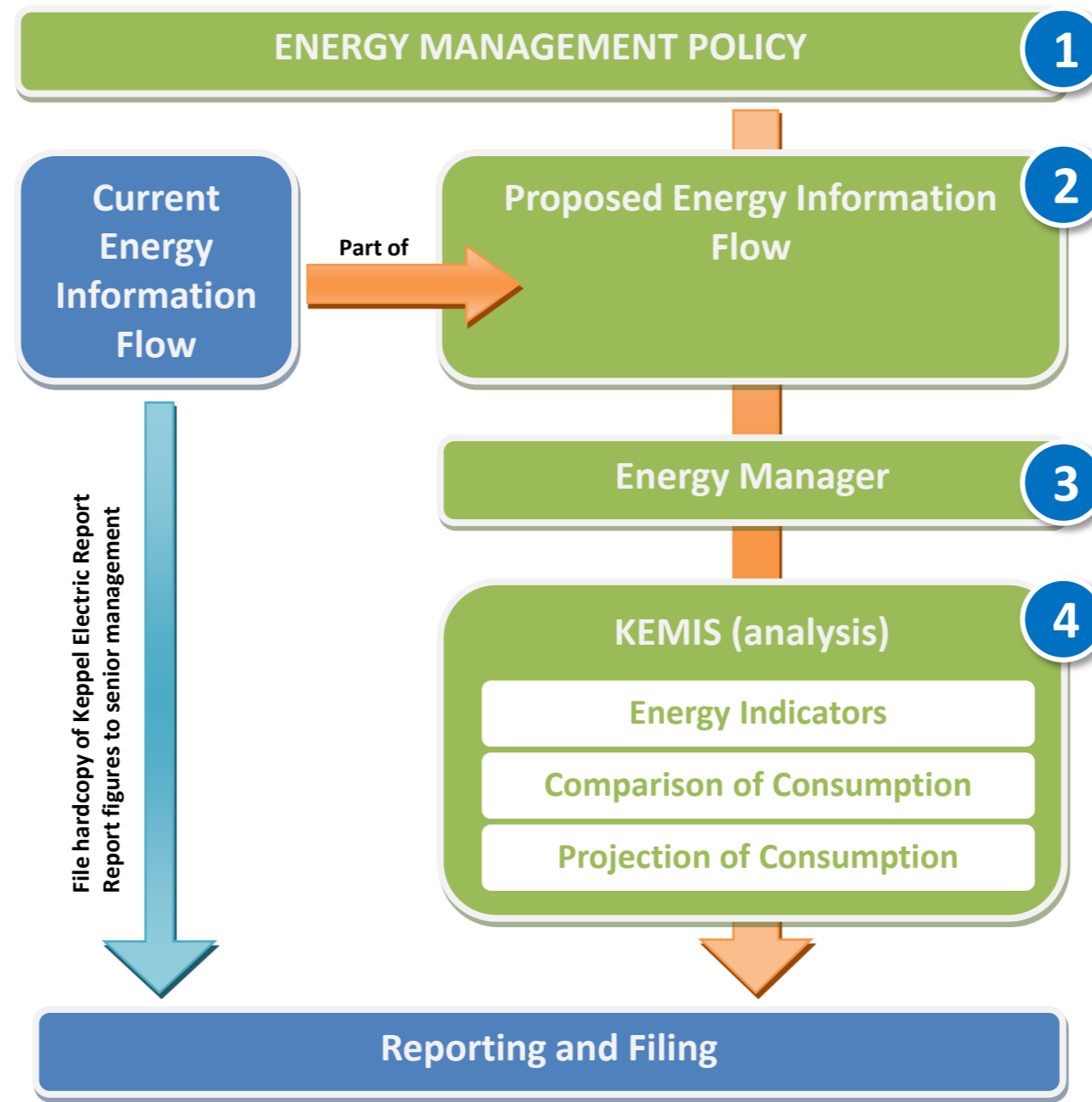
Keppel FELS

Project Overview

OBJECTIVE
To develop an Energy Management System, that will facilitate Keppel FELS in managing public-grid electricity consumption in Pioneer Yard, so as to protect the environment and minimize cost.
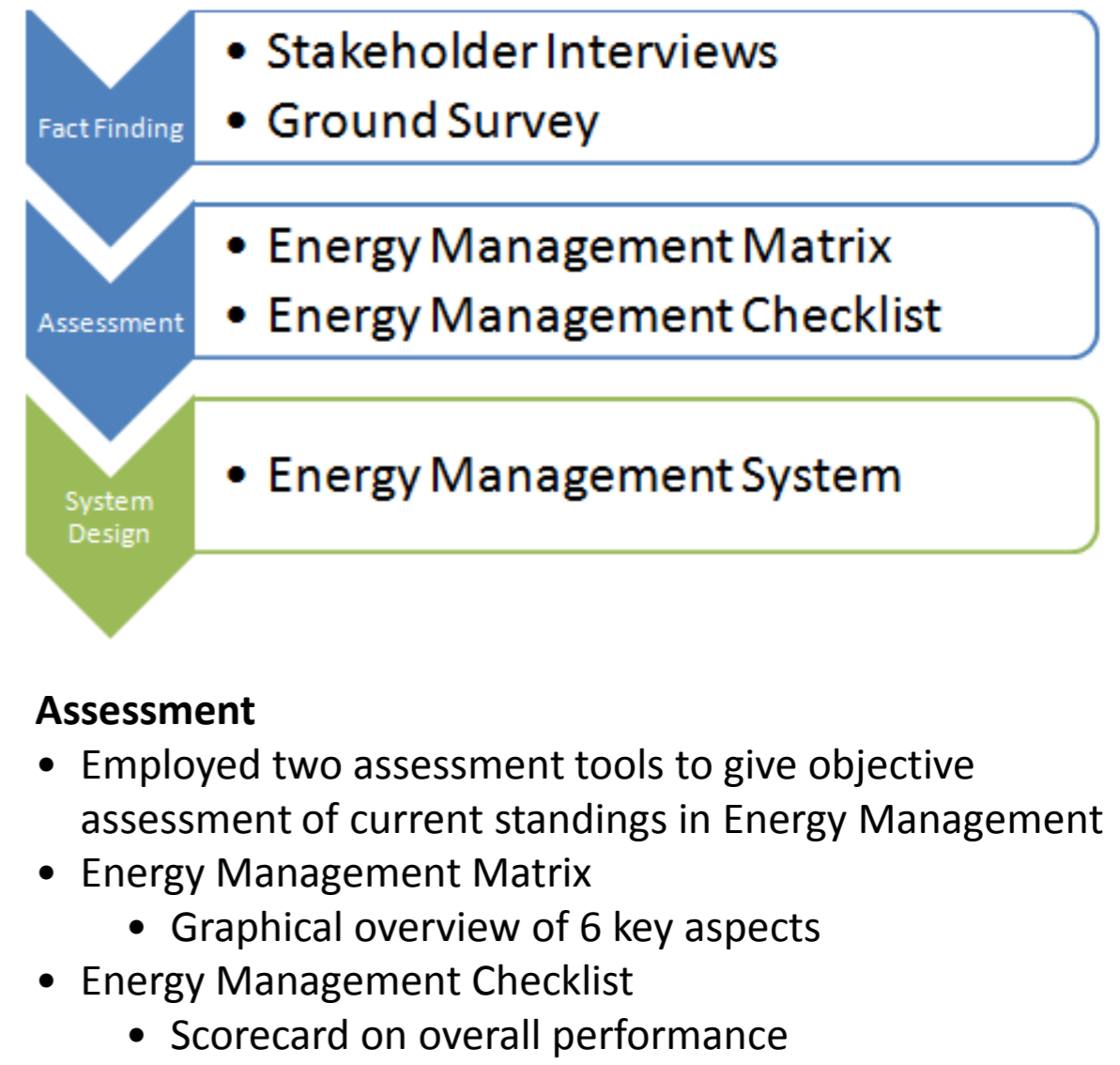
MOTIVATION TO IMPLEMENT SYSTEM
- Environmental protection is a social responsibility as well as a business imperative
- Exploiting cost-saving opportunities
- Lay foundation for compliance with ISO 50001 on Energy Management to be released in 2010
- Possible regulations if Singapore comes under ANNEX I of Kyoto Protocol
- Potential revenue from Carbon Trading

Legend
Current Practice   Proposed System

ENERGY MANAGEMENT SYSTEM DIAGRAM

ENERGY MANAGEMENT POLICY — 1

Current Energy Information Flow — Part of → Proposed Energy Information Flow — 2

Energy Manager — 3

KEMIS (analysis) — 4
- Energy Indicators
- Comparison of Consumption
- Projection of Consumption

File hardcopy of Keppel Electric Report / Report figures to senior management

Reporting and Filing

APPROACH

Fact Finding
- Stakeholder Interviews
- Ground Survey

Assessment
- Energy Management Matrix
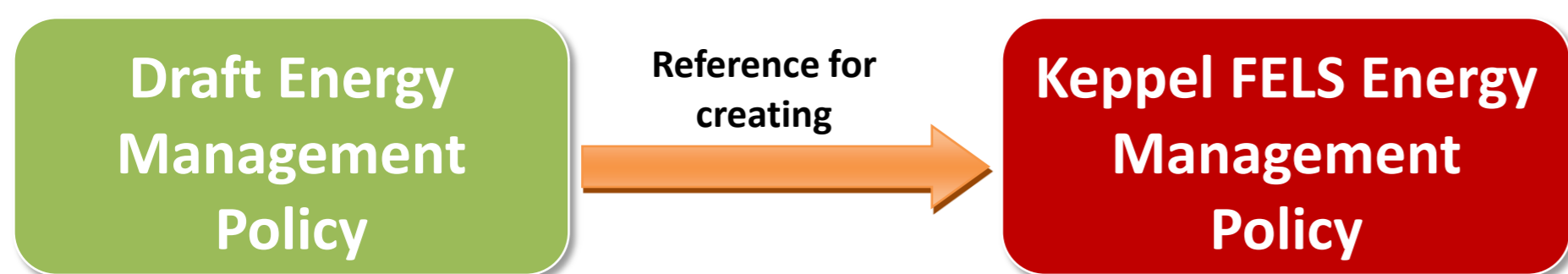- Energy Management Checklist

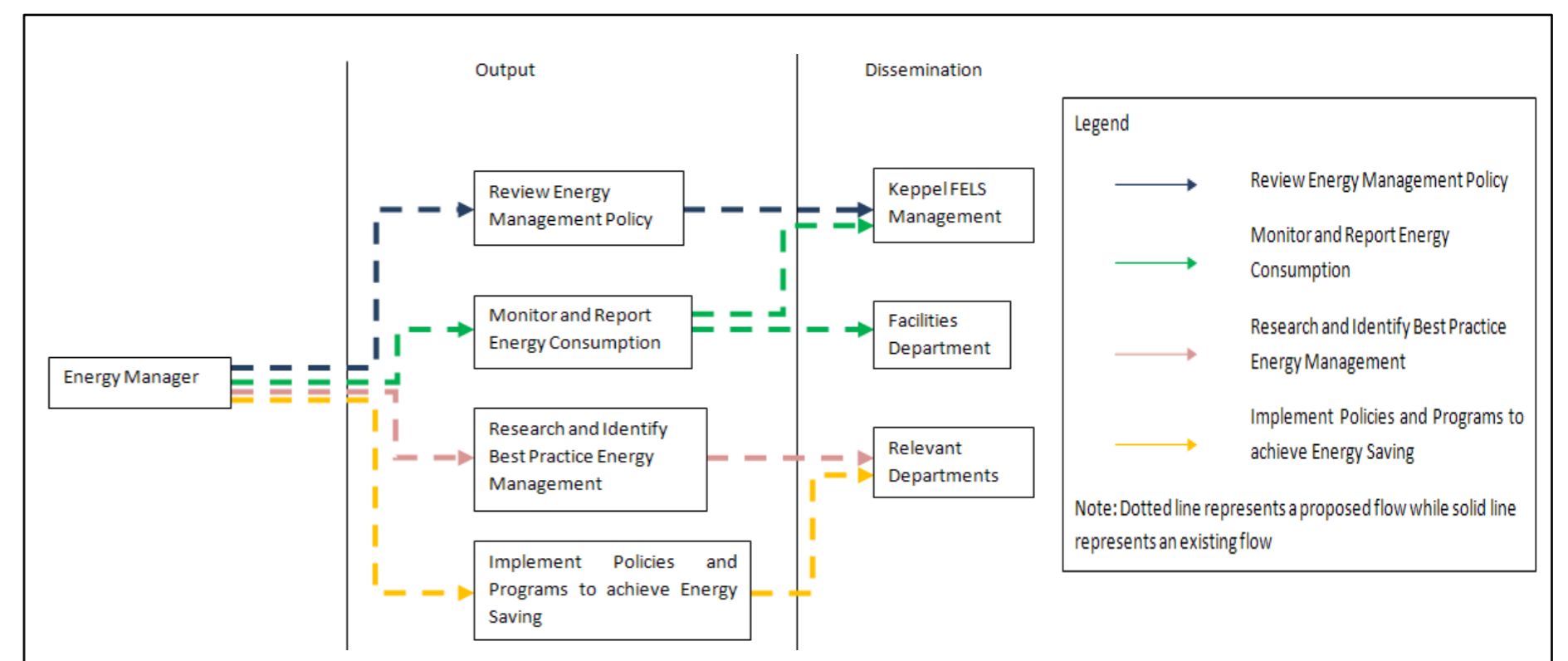System Design
- Energy Management System

Assessment
- Employed two assessment tools to give objective assessment of current standings in Energy Management
- Energy Management Matrix
  - Graphical overview of 6 key aspects
- Energy Management Checklist
  - Scorecard on overall performance

1. Energy Management Policy

Draft Energy Management Policy — Reference for creating → Keppel FELS Energy Management Policy

- Drafted a reference Energy Management Policy for Keppel FELS to create own policy
- For implementing energy management practices in the organization, the policy lays out:
  - Commitment
  - Objectives & Goals
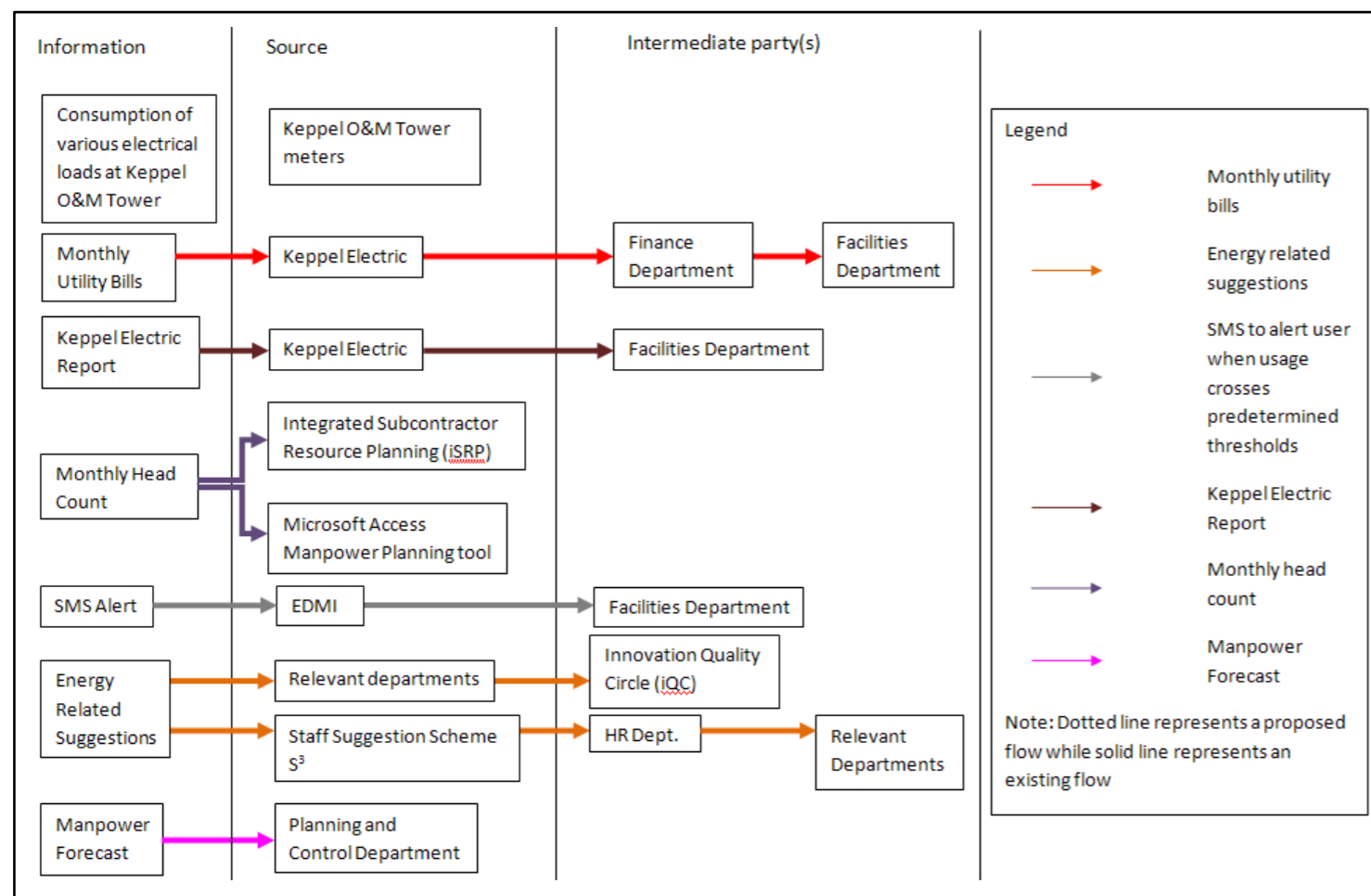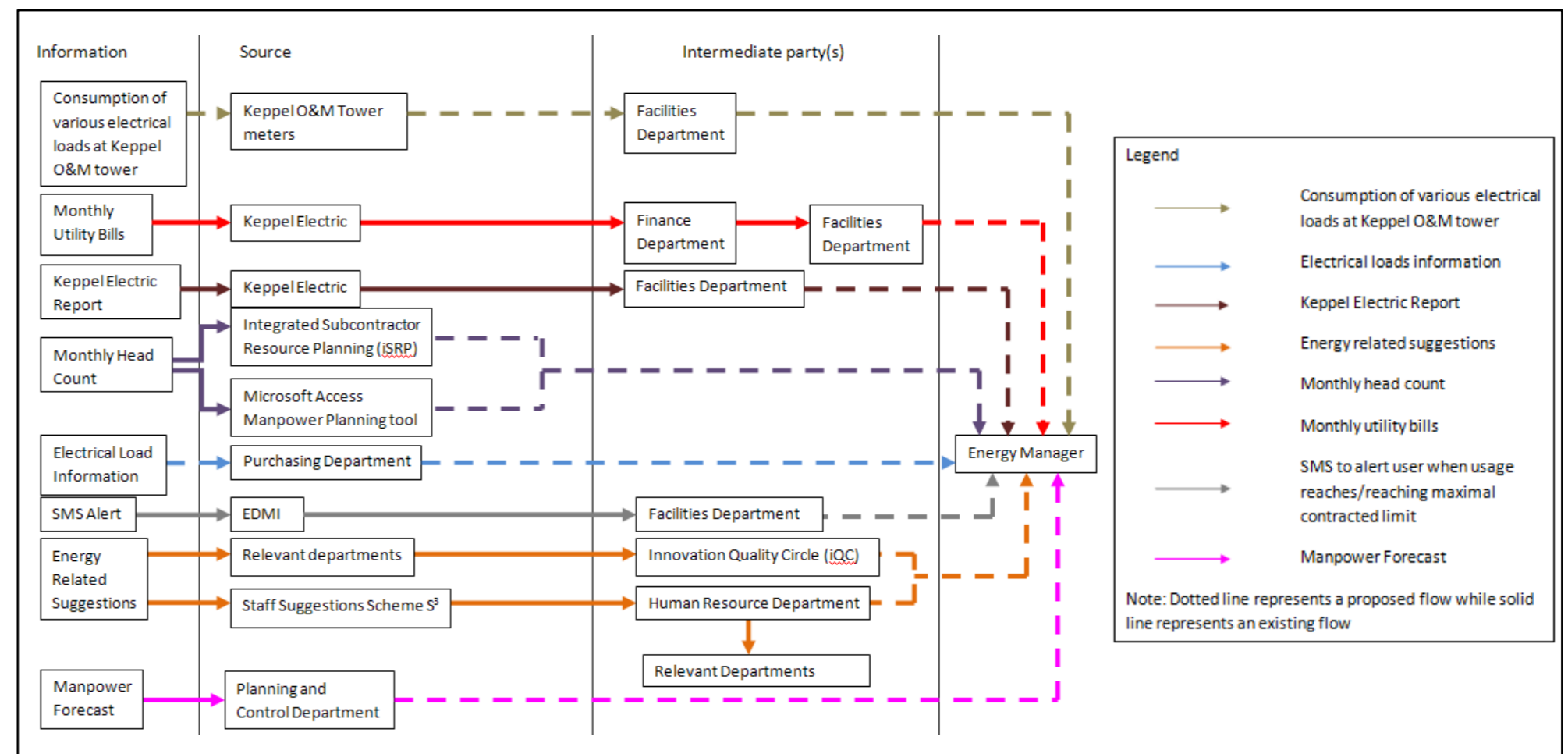 - Responsibilities
  - Action plan

3. Energy Manager

- Introduced the role and responsibilities of the Energy Manager
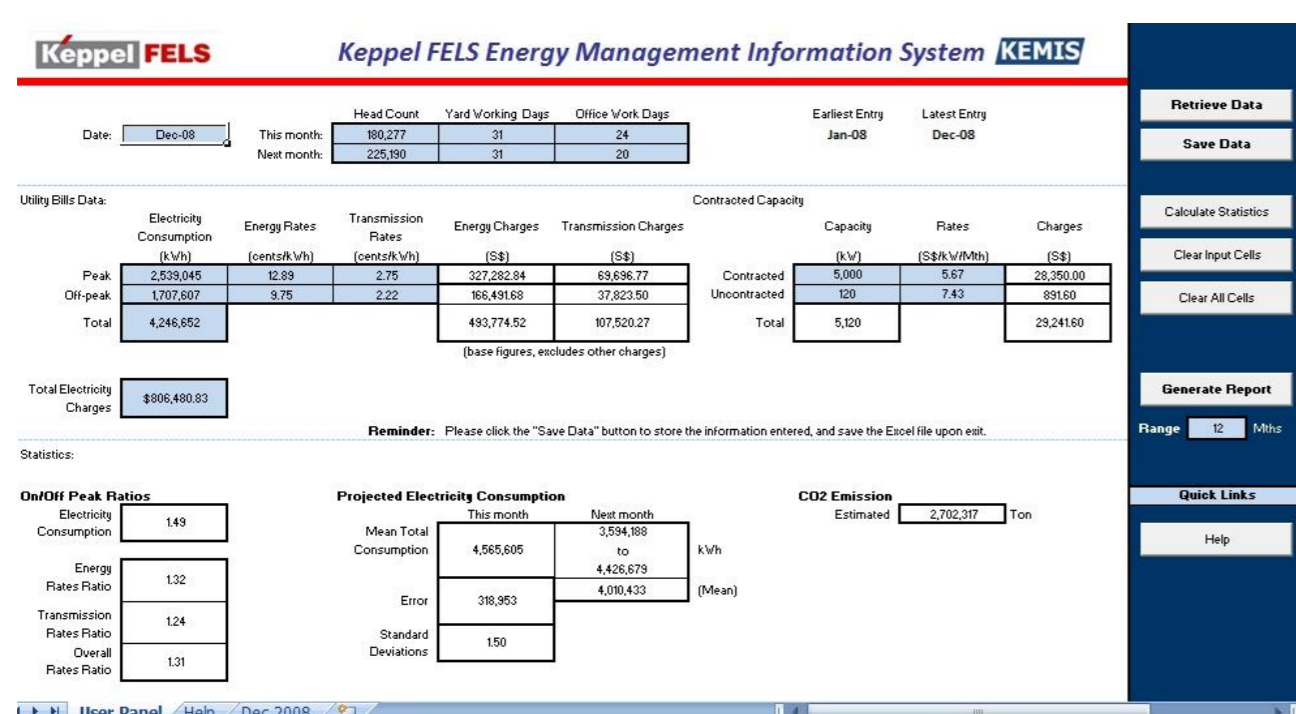
2. Energy Information Flow

Current Information Flow
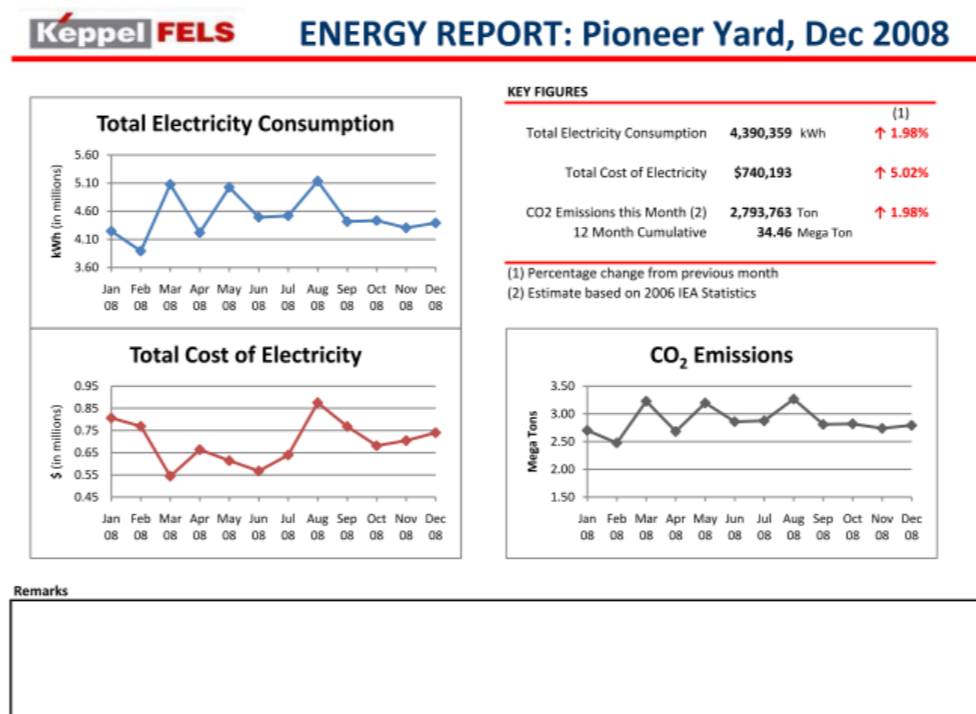

Proposed Information Flow

4. KEMIS

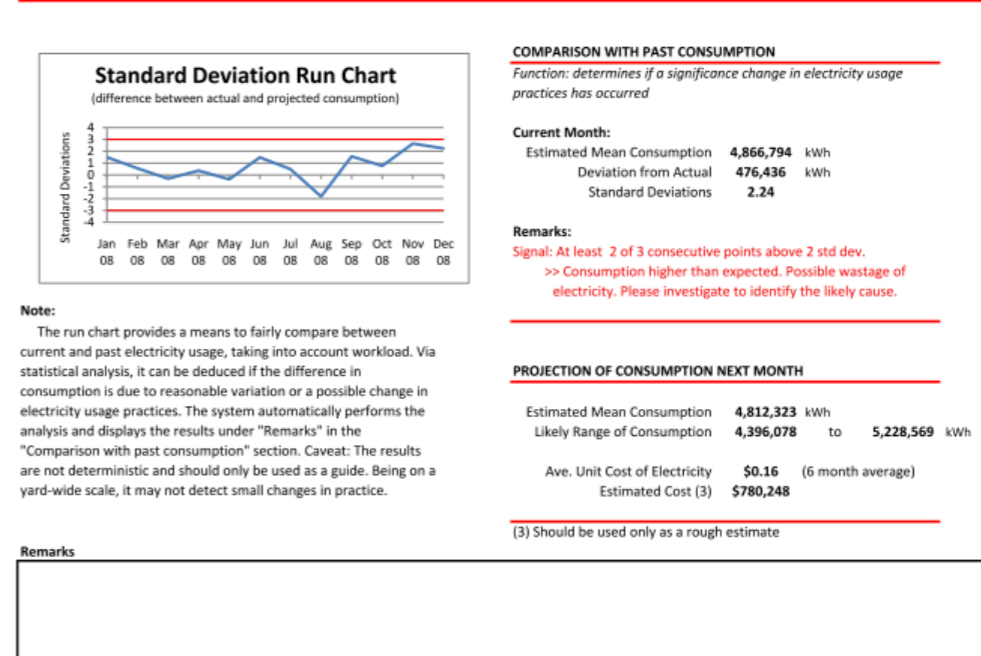**Keppel FELS Energy Management Information System (KEMIS)**

- Calculates energy consumption indicators to support analysis
- Projects next month's electricity consumption
- Identifies possible wastage or energy savings
- Stores the above data
- Automatically generates printable report

Energy Management Report

ENERGY REPORT: Pioneer Yard, Dec 2008

ENERGY REPORT: Pioneer Yard, Aug 2008

- 5 page report generated by KEMIS
- For use by senior management and stakeholders
- Includes estimated CO_2 emissions
- Plots peak to off-peak ratios to facilitate analysis (*not shown in screenshot*)

- Uses regression model to project future consumption
- Plots deviation between projected and actual consumption to identify significant changes in electricity usage

Team Members: Li Zongyin (Leader), Alex Tay, Hee Chun Hui, Jenny Fung
Supervising Professors: A/P Huang Huei Chuen, A/P Tan Kay Chuan
Industrial Supervisor: Mr Jason Goh

Note: Sample data presented has been disguised