Energy & GHG Emissions Reduction – An industrial case study

Eight session of the Group of Experts on Energy Efficiency

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Advisian - consulting business of Worley

Worley delivers projects and provides engineering, procurement & construction expertise to the energy, chemicals and resources sectors.

Advisian is the global advisory, consulting and early project development line of business for Worley and is a key enabler to the broader business.

Unique to its offering is the ability to combine technical and advisory valued solutions across the full lifecycle.

Advisian Business Lines

- Asset & Advisory
- Upstream Midstream LNG
- Refining & Chemicals
- Decarbonisation & Energy Transition
- Power Conventional & Renewable
- Technology & Innovation

Asset lifecycle and our services

Identify → Evaluate → Define → Execute → Operate

Advisian offers consulting services across the lifecycle

Advisian Worley & Worley
All the elements of decarbonization need to be considered in combination, not isolation.

- **Process/energy efficiency**
  - Scope 1
  - Operate in yield/energy efficient manner, electrification of key drivers
  - Monitor, report and act

- **Renewable power**
  - Scope 2
  - As plant electrifies Scope 2 emissions increase; renewable power provides a proven technology solution plus integral part of H₂ economy

- **Hydrogen economy**
  - Scope 1 & 3
  - Green or blue hydrogen projects enable fuel switching to take place and support low carbon feedstocks

- **Low carbon feedstocks**
  - Scope 3
  - Renewable fuels and low carbon products

- **Circular economy**
  - Scope 3
  - Integration of chemical recycling of plastics within the refinery / petrochemical / polymer supply chain

- **Carbon capture utilization and storage**
  - Scope X
  - Match sources of CO₂ against sinks; integration within industrial hubs

Underpinned by understanding of regional energy policy/regulations, digitalization advances, monitoring and reporting, and supporting organizational governance plus realistic business case development.
Enabling the Energy Transition

Energy and \( \text{CO}_2 \) emissions reduction
Project Highlights
Case Study

• A petrochemical complex (Cumene-Phenol) in the South of Spain

• Energy Bill
  - >100 t/h of steam import from next door refinery
  - >100 MW of natural gas import to fire a Hot Oil utility furnace
  - ~ 20 MW of electricity

• Study Objectives
  - Identify opportunities for energy and GHG reduction
  - Client is looking for a STEP CHANGE, not a marginal reduction
  - Payback 2 to 5 years
  - Apply Pinch Analysis
  - Technology Transfer
Our approach to Energy and GHG Reduction

- **Determine Base Line**
- **Understand the production process**
- **Interactive workshops & brainstorming**
- **Energy Benchmarking & Energy Targeting (Pinch Analysis)**
- **Identify projects**
- **Feasibility Analysis**
- **Implement selected projects**
Results

• Study identified 25 project ideas:
  - Operational changes: 7
  - Capital (process design) changes: 18

• Annual energy bill reduced by 16%
Results

• Some operational changes included:
  - Relax specifications (purity)
  - Reduce column operating pressure
  - By pass a preheater
  - Distillation column feed tray optimization

• Some capital changes included:
  - Improve process heat recovery
  - Increase preheating of one of the streams
  - Install side condenser in one of the columns
  - Increase pressure of low-pressure steam generation for site’s heat integration
  - Feed conditioning to one of the distillation columns
  - Use low-pressure steam for stripping
  - Waste heat recover
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