



**Sustainable Design**  
Introduction

Authorized by Lars Munklee

[www.setatwork.eu](http://www.setatwork.eu)

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**Course structure**

1. Introduction
2. Workflow in Sustainable Design projects
3. Tools for Sustainable Design
4. Integration with design practices
5. Organisation and stakeholders
6. Success with Sustainable Design

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## Agenda

- Course outline
- Background
- What is Sustainable Design
- Case
- Advice from companies

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## Course outline

- Introduction to concept
- of Sustainable Design
- Sustainable Design step by step
- Tools
- Examples from industry
- Organisation and project stakeholders
- Sustainable Design into current design practices
- How to achieve success

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## Background

- Strong focus on Climate Change in private sector
- Existing focus often addresses existing manufacturing equipment
- Increased feasibility of emission reduction projects if implemented as part of project design
- Need for addressing energy performance in industrial design practices

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## What is Sustainable Design

- Technique for investment projects
- Applied during design of any industrial process consuming energy, water and raw materials
- Improves environmental and energy performance of industrial production processes
- Increased efficiency compared to pre-defined baseline

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## Characteristics

- The 'Client' is an industry
- An independent activity in parallel with project design
- No impact on ordinary project schedule
- Conducted by project independent resources
- Contains three steps
  - Baseline
  - Analysis
  - Implementation

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## About getting more for less

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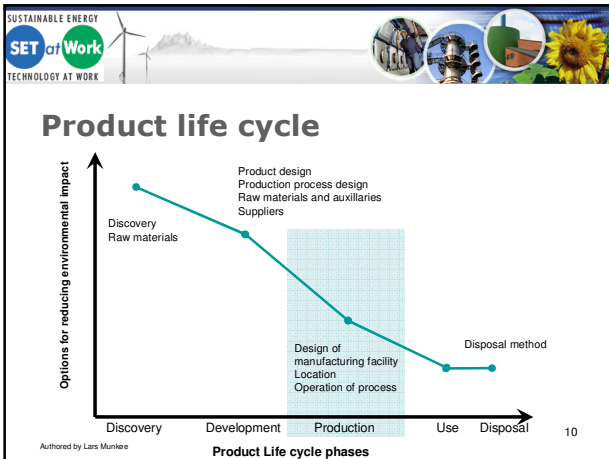
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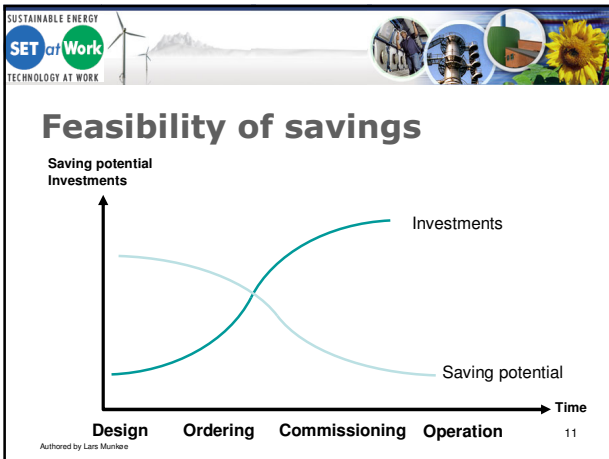
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**Case**  
 Solvent recovery in pharmaceutical industry

- Distillation column for regeneration of Ethanol for production
- Base case:
  - Process requirements defined by R&D department and users
  - Specified by Engineering company
  - Design by supplier
  - Life time 15 years

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## Saving opportunities

- Reduced %w/w of Ethanol recovered  
 88% → 80% reduces steam consumption by 40%
- Batch definition and operation reduces needs for analysis and cleaning of tanks, distribution system and distillation column
- Cleaning In Place sequence optimisation reduces consumption of water, energy and chemicals

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## Saving opportunities, contd.

- Heat recovery in distillation column reduces steam consumption
- Heat recovery supplies on-site district heating
- Elimination of chilled water supply reduces energy consumption and investment in chiller capacity

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## Case

### Solvent recovery in pharmaceutical industry

Category	Baseline (%)	After EED (%)
Investment	~30	~30
CIP	~10	~10
Maintenance	~10	~10
Energy	~10	~10
Heat recovery	~0	~10
Analysis	~10	~10
pH-adjustment	~0	~0
<b>Total</b>	<b>100</b>	<b>44</b>

Life cycle costs reduced by 56%  
 Payback period < 3 years

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## Advice from companies

- Establish Sustainable Design team which is independent from project design activities
- Avoid design responsible reviewing own work
- Start as early as possible in the project design
- Ensure management commitment for achieving success

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**The end**

Thank you for your attention

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