Asset Management - Lifecycle costing: Can you invest in the future and afford not to apply it?

- Asset Management -

Andre Jordaan; 3 October 2016, AMEU Conference
Examples: Asset Acquisition
We all know that it’s not just prevalent in Government

Private sector gets it wrong. 
Other countries gets it wrong.
Case Study: British Columbia Fast Ferries

Late 1990s: FastCat Fiasco
- ineffective asset creation and acquisition processes

Requirement: Three custom-designed high speed passenger/vehicle ferries

Goal was to improve ferry service between mainland terminal of Horseshoe Bay and the Vancouver Island terminal

Built locally as part of political drive to rebuild BC shipping industry
Case Study: British Columbia Fast Ferries

Outcome:
- Budget $210m, final cost $460m
- Final delivery 3 years behind schedule
- Ferries auctioned off for $19m in 2003, four years after commissioning

Poor design: No passenger deck space, high fuel consumption, increased loading time due to balancing issues

Unreliability: Breakdowns

Political interference: Contract not awarded to competent supplier

Lack of project management discipline: No feasibility study or risk analysis, no project review or re-evaluation
Asset Management principles at play

# Demand Analysis
# Requirement Analysis
# Systems Engineering

# Life cycle costing
# Portfolio Management

**Lifecycle Costing:**
Opportunity to influence costs is concentrated at the planning and acquisition stages.
Case Study: Solar vs. Diesel Power

- Requirement: 2 bore holes sunk for a municipality, 10km from town, which technology is most appropriate for this remote site:

1. Solar

Life expectancy: R 20 years

R 940,000 = R 590,000 + R 350,000

Excl. Batteries Batteries

2. Diesel

Life expectancy: 6 years

R 88,000

20 years, 10 year overhaul
Case Study: Solar vs. Diesel Power (EAC Method)

The diesel is but 1/10\textsuperscript{th} of the capital outlay, but costs 85\% more than solar in the long term.

### Input Values
- a) Interest rate 10.0\%
- b) CPIX for services, fuel and electricity 5.0\%
- c) Discount rate 5.0\%

#### Option 1: Solar Power
1. Acquisition and installation cost of all items excluding batteries R 590,000
2. Life of all items excluding batteries 20 years
3. Acquisition and installation cost of batteries (deep cycle) R 350,000
4. Life of batteries (deep cycle) 6 years
5. Operating and maintenance cost per year for solar power system R 3,600

**EAC**
- Acquisition R 47,343
- Batteries R 68,956
- Annual maintenance R 3,600
- **Total** R 119,899

#### Option 2: Diesel Power
1. Acquisition and installation cost R 83,000
2. Overhaul cost after 10 years R 20,000
3. Life of diesel system 20 years
4. Operating and maintenance cost per year for diesel system
   - Fuel R 187,800
   - Services R 18,000
   - Fuel Transport R 7,800

**PV**
- Acquisition R 83,000
- Overhaul R 12,278
- **Total** R 95,278

**EAC**
- Acquisition and overhaul R 7,645
- Annual maintenance R 213,600
- **Total** R 221,245

### EAC Method: Nett Present Values of Each of the Solutions

<table>
<thead>
<tr>
<th>Year</th>
<th>Solar</th>
<th>Diesel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EAC R 119,899</td>
<td>EAC R 221,245</td>
</tr>
<tr>
<td></td>
<td>R 119,899</td>
<td>R 221,245</td>
</tr>
<tr>
<td>2</td>
<td>R 119,899</td>
<td>R 221,245</td>
</tr>
<tr>
<td>3</td>
<td>R 119,899</td>
<td>R 221,245</td>
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<tr>
<td>4</td>
<td>R 119,899</td>
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<tr>
<td>5</td>
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<td>6</td>
<td>R 119,899</td>
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<tr>
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</tbody>
</table>

**Total NPV**
- Solar R 2,188,872 (Calculated over 50 years)
- Diesel R 4,039,039

**NPV Diff**
- R 1,850,167
Case Study: Solar vs. Diesel Power (Cash Flow Method)

The diesel is but 1/10th of the capital outlay, but costs 90% more than solar in the long term.

### Input Values

- **a) Interest rate**: 10.0%
- **b) CPIX for services, fuel and electricity**: 5.0%
- **c) Discount rate**: 5.0%

### Option 1: Solar Power

1. **Acquisition and installation cost of all items excluding batteries**: R 590,000
2. **Life of all items excluding batteries**: 20 years
3. **Acquisition and installation cost of batteries (deep cycle)**: R 350,000
4. **Life of batteries (deep cycle)**: 6 years
5. **Operating and maintenance cost per year for solar power system**: R 3,600

### Option 2: Diesel Power

1. **Acquisition and installation cost**: R 83,000
2. **Overhaul cost after 10 years**: R 20,000
3. **Life of diesel system**: 20 years
4. **Operating and maintenance cost per year for diesel system**: R 213,600

### Cash Flow Method: Breakeven (Incl. NPV and EAC)

### Total Cost Comparison in PV terms

#### Solar Cum. Total

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<th>11</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>943,600</td>
<td>947,036</td>
<td>950,431</td>
<td>953,448</td>
<td>956,436</td>
<td>959,289</td>
<td>1,226,770</td>
<td>1,229,369</td>
<td>1,231,850</td>
<td>1,234,219</td>
<td>1,236,480</td>
<td>1,238,751</td>
</tr>
<tr>
<td>EAC</td>
<td>126,340</td>
<td>126,048</td>
<td>125,753</td>
<td>125,458</td>
<td>125,163</td>
<td>124,868</td>
<td>1,280,256</td>
<td>1,279,960</td>
<td>1,279,664</td>
<td>1,279,368</td>
<td>1,279,072</td>
<td>1,278,776</td>
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#### Diesel Cum. Total

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<tr>
<td>NPV</td>
<td>4,386,315</td>
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#### Input Values

- **a) Interest rate**: 10.0%
- **b) CPIX for services, fuel and electricity**: 5.0%
- **c) Discount rate**: 5.0%

### Option 1: Solar Power

1. **Acquisition and installation cost of all items excluding batteries**: R 590,000
2. **Life of all items excluding batteries**: 20 years
3. **Acquisition and installation cost of batteries (deep cycle)**: R 350,000
4. **Life of batteries (deep cycle)**: 6 years
5. **Operating and maintenance cost per year for solar power system**: R 3,600

### Option 2: Diesel Power

1. **Acquisition and installation cost**: R 83,000
2. **Overhaul cost after 10 years**: R 20,000
3. **Life of diesel system**: 20 years
4. **Operating and maintenance cost per year for diesel system**: R 213,600

### Cash Flow Method: Breakeven (Incl. NPV and EAC)

#### Solar Cum. Total

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<td>359,644</td>
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#### NPV

- **Solar**: 2,306,456 (Calculated over 50 years)
- **Diesel**: 4,386,315 (Calculated over 50 years)

#### EAC

- **Solar**: 126,340
- **Diesel**: 240,268
Case Study: Solar vs. Diesel Power - Sensitivity Analysis

The diesel is but 1/10\textsuperscript{th} of the capital outlay, but costs 85\% more than solar in the long term.

<table>
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<th>Solar</th>
<th>Diesel</th>
<th>Diff.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPV (Cost over 50 years)</td>
<td>R 2,2m</td>
<td>R 4,0m</td>
<td>85%</td>
</tr>
</tbody>
</table>

1. Scenario: Primarily used in summer/winter: demand drops to 50\% design requirement.

NPV (50 years) at 50\% load

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<tr>
<td>R 2,2m</td>
<td></td>
<td>R 2,1m</td>
<td>-5%</td>
</tr>
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</table>

2. Scenario: Diesel fuel halves throughout the designed life (50 years)

NPV (50 years) at 50\% load

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<th>Diesel</th>
<th>Diff.</th>
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<tr>
<td>R 2,2m</td>
<td></td>
<td>R 2,3m</td>
<td>6%</td>
</tr>
</tbody>
</table>
Don’t be fooled

• If Solar PV is so much better than fuel, is it cost effective for households?

Financially: Questionable
• Payback period well over 10.8 years (i.e. without even taking the replacement of the batteries into account).

The benefit: No electricity outages during load shedding.
“She comes with a Coffee Machine”
Case Study: Coffee

1. Plunger
   - R 100

2. Nespresso
   - R 2,000

3. Bean to Cup
   - R 10,500
   - R 15,000
   - R 18,000
Case Study: Coffee

Model: 4 cups/day

1. Plunger
   - Flavours: Medium
   - Freshness: Poor
   - Energy: Poor
   - Ease of use: Slow
   - Price: R 100

2. Nespresso
   - Flavours: Easy
   - Freshness: Excellent
   - Energy: Excellent
   - Ease of use: Good
   - Price: R 2,000

3. Bean to Cup
   - Flavours: Hard
   - Freshness: Good
   - Energy: Excellent
   - Ease of use: Good
   - Price: R 15,000

Pragma
### Case Study: Coffee

<table>
<thead>
<tr>
<th>Model: 4 cups/day</th>
<th>1. Plunger</th>
<th>2. Nespresso</th>
<th>3. Bean to Cup</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>![Plunger Image]</td>
<td>![Nespresso Image]</td>
<td>![Bean to Cup Image]</td>
</tr>
<tr>
<td></td>
<td><strong>R 100</strong></td>
<td><strong>R 2,000</strong></td>
<td><strong>R 15,000</strong></td>
</tr>
<tr>
<td></td>
<td>![Plunger Price]</td>
<td>![Nespresso Price]</td>
<td>![Bean to Cup Price]</td>
</tr>
</tbody>
</table>

|                   | **R 62**  | **R 7**  | **R 62**  |
|                   | ![Plunger Price] | ![Nespresso Price] | ![Bean to Cup Price] |

<table>
<thead>
<tr>
<th></th>
<th>EAC (6 years)</th>
<th>NPV (6 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plunger</strong></td>
<td><strong>R 2,900</strong></td>
<td><strong>R 15,800</strong></td>
</tr>
<tr>
<td><strong>Nespresso</strong></td>
<td><strong>R 10,200</strong></td>
<td><strong>R 55,200</strong></td>
</tr>
<tr>
<td><strong>Bean to Cup</strong></td>
<td><strong>R 5,600</strong></td>
<td><strong>R 30,400</strong></td>
</tr>
</tbody>
</table>
Case Study: Coffee – Sensitivity Analysis

EAC per options:

- 2 cups/day: 24%
- 4 cups/day: 82%
- 6 cups/day: 115%
Management cannot afford making uninformed decisions.

Lifecycle costing allows for informed decision-making.
Contact

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- Mobile: +27 (0)83 2735454
The End