The Multiple Benefits of Energy Efficiency

Dr. Catherine Cooremans

IEA DSM Workshop
Halifax
Outline

1. Context
2. Understanding investment behavior
3. Influencing investment behavior
4. Conclusion
I. CONTEXT
IEA report, Capturing the multiple benefits of energy-efficiency, Paris, September 2014:

- Macro-economic impacts
- public budget impacts
- Health & well-being impacts
- Industrial sector impacts *(in a broad sense)*
- Energy delivery impacts
A huge energy-efficiency potential remains untapped

Two-thirds of the economic potential to improve energy efficiency remains untapped in the period to 2035

Source: Philippe Benoît, Several IEA strategic actions to increase energy-efficiency, EEMR 2015 and Multiple Benefits, ECEEE workshop, Brussels, October 21, 2014.
The common engineers’ “technico-economic” approach:

... does not work.
PART I

Understanding investment behavior
Profitability is the key

Conclusion: not observed in the reality.
Profitability plays an important role but not a decisive one in investment decision-making:

- “Profitability of an investment is not sufficient to entail a positive decision” (37/44 – 15/17)

- “A project can be realized even if it is not profitable” (10/17)

Strategic investments win the competition:

- “Above all, a project must contribute to the realization of the company’s strategic goals” (16/17 – 40/44)
Investment amount and category influence:

- Procedure
- Type of analysis applied
- Capital budgeting tools used
- Profitability requirements
- Steps the investment process has to follow
- Resort to external financing
- Champion supporting the project
Conceptual framework

Competitive dimension of decision-making

Interwoven streams of issues competing for resources.
Non strategic issues loose the competition.

Langley et al. (1995)
Research finding 1:

• Financial logic not decisive
• Strategic logic more important
  in businesses’ investment choices
Actors have mindsets and cognitive filters:

"...executives' experiences, values, and personalities affect their field of vision (the directions they look and listen), selective perception (what they actually see and hear), and interpretation (how they attach meaning to what they see and hear).”

(Hambrick, 2007, p. 337).

“I see it when I believe it”
Understanding investment behavior

Filters...

"What’s a corner?"

J. Whiting in E. Schein, Organizational Culture and Leadership, 2004, p. 113
Understanding investment behavior

Redesigning the energy-efficiency barriers concept:

- **‘Base’ Barrier**
  - Information
  - Hidden costs
  - Access to capital
  - Risk, etc.

- **‘Symptom’ Barrier**

- **‘Real’ Barrier**
  - No strategic dimension

- **‘Hidden’ Barrier**
  - Cultural dimension
PART II

Influencing investment behavior

Make it strategic!
Competitiveness

**Strategy:**
a balance between internal resources and external factors in order to build a durable competitive advantage, through resources allocation. (Johnson & Scholes, 1999)
Strategy: a balance between internal resources and external factors in order to build a durable competitive advantage, through resources allocation. (Johnson & Scholes, 1999)
Definitions:

- **An investment is strategic** if it contributes to create, maintain or develop a sustainable competitive advantage (Cooremans, 2011)

- **Competitive advantage** is a three-dimensional concept, formed of three interrelated constituents: value, costs and risks (Porter, 1985; Cooremans, 2011)
The three dimensions of competitive advantage: 

- **Value**: = value proposition = the value a firm is able to create for its customers. The higher the value, the higher the sales.

- **Costs**: borne to create and deliver the value proposition.

- **Risks**: borne to create and deliver the value proposition.

---

The three dimensions of competitive advantage Cooremans, 2011
The “9-block business model” analysis:

The Business Model Canvas

- Key Partners
- Key Activities
- Value Propositions
- Customer Relationships
- Customer Segments
- Key Resources
- Channels
- Cost Structure
- Revenue Streams

www.businessmodelgeneration.com
Competitive advantage:

Value proposition first!

“a set of benefits that a product (or a service) promises to deliver”
Kotler, 1999
Value proposition in questions…

- Which value do we bring to our customer?
- Which problem do we help him solve?
- Which needs do we answer to?
- Which combinations of products and services do we propose to each customer segment?

... and answers:

For many companies, strategic advantage is based on a “superior value” stemming from providing unique benefits and not for offering lower prices.

As emphasized by Michael Porter:

“Value, instead of cost, must be used to assess competitive position since firms often deliberately raise their cost in order to command a premium price via differentiation” (Porter, 1985:38).
Multiple (strategic) benefits of energy efficiency

Workshop

Value proposition

Costs

Risks

•

•

• Etc.

•

•

• Etc.

•

•

• Etc.
Multiple (strategic) benefits of energy efficiency

Make it strategic!

Costs

Risks

Value proposition

- ↓ Raw materials
- ↓ Maintenance costs
- ↓ Equipment oversizing
- ↓ Employee turnover
- etc.

- ▲ Product quality
- ▲ Product reliability
- ▲ Facilities security
- Etc.

- ↓ Commercial risk
- ↓ Equipment breakdown
- ↓ Legal risks
- ↓ CO2 risks
- Etc.
Ex Large chain grocer – Led lighting investment

Make it strategic!

Value proposition

Costs

Risks

• ↓ Product lost
• ↓ Maintenance costs
• (↓ Energy cost)

• ↑ Food (meat & fish) appearance
• ↑ Food quality (bacteria)
• Lighting quality
• Image

• ↓ Commercial risk
• ↓ Legal risks
• etc.
Rules:

• Do not take into account energy cost reductions only, but all cost reductions

• Take into account not only cost reductions but also a possible increase in sales (thanks to higher quantity sold and/or to a price premium)

• Risk reduction can often be translated into cost reduction (quantitative terms). If not possible then qualitative risk analysis
“Competitive advantage cannot be understood by looking at a firm as a whole. It stems from the many discrete activities a firm performs in designing, producing, marketing, delivering and supporting its product. Each of these activities can contribute to a firm's relative cost position and create a basis for differentiation.”

(Porter, 1985:33)
Process mapping:
ex. aluminum foil production process map

Process supplier → casting → Pusher furnace → Hot mill → Cold mill → Thermal treatment → Process customer
Aluminium foil production
process mapping + energy services

Process supplier
→ casting → Pusher furnace → Hot mill → Cold mill → Thermal treatment → Process customer

Air conditioning
Automation
Compressed air
High temp. heat
Lighting
Mobile motive power
Refrigeration positive c.
Ventilation

Air conditioning
Automation
Compressed air
Lighting
Fixed motive power
Mobile motive power
Refrigeration positive c.
Ventilation

Air conditioning
Automation
Compressed air
Medium temp. heat
Lighting
Mobile motive power
Refrigeration positive c.
Ventilation
Integrating energy & operations approaches erases the line between process energy services and ancillary energy services and opens the door to strategic analysis.
Influencing investment behavior

Once identified, multiple benefits of energy-efficiency projects have to be translated into financial calculations

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting project</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Revenues
- Energy benefits - Financial savings from energy consumption reduction: 11'169 11'169 11'169 11'169 11'169
- Non-energy benefits 1 - Impact on maintenance: 2'366 2'366 2'366 2'366 2'366
- Non-energy benefits 2 - ....: 0 0 0 0 0
- Non-energy benefits 3 - ....: 0 0 0 0 0

Total gross revenues: 13'535 13'535 13'535 13'535 13'535

- Lamps furniture: 2'700 2'700 2'700 2'700 2'700
- Depreciation: 850 850 850 0 0
- Net income before taxes: 9'985 9'985 9'985 10'835 10'835
- Taxes: 2'396 2'396 2'396 2'600 2'600
- Net income after taxes: 7'589 7'589 7'589 8'235 8'235
- Depreciation: 850 850 850 0 0

Net income: 8'439 8'439 8'439 8'235 8'235
### Bridging strategicity with financial analysis

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lighting project</strong></td>
<td></td>
<td>8'439</td>
<td>8'439</td>
<td>8'439</td>
<td>8'235</td>
<td>8'235</td>
</tr>
<tr>
<td>Net income</td>
<td>2'550</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Capital expenditure</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Terminal value before taxes</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Terminal value after taxes</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Free Cash-Flows</strong></td>
<td>-2'550</td>
<td>8'439</td>
<td>8'439</td>
<td>8'439</td>
<td>8'235</td>
<td>8'235</td>
</tr>
<tr>
<td><strong>NPV (NET PRESENT VALUE)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15%</td>
<td>11'169</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9%</td>
<td>29'996</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5%</td>
<td>33'657</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>IRR (INTERNAL RATE OF RETURN)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>311%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PAY-BACK TIME</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.30</td>
</tr>
</tbody>
</table>
CONCLUSION
• Financial logic is not decisive
• Strategic logic is more important in businesses’ investment choices
The common engineers’ “technico-economic” approach:

Energy savings → Financial savings → Investment decision

… does not work.
A comprehensive analysis to build up the business case of energy-efficiency investment projects

**Value proposal**

**Costs**

**Risks**

**Conclusion & take home messages**

**Quantitative analysis**

**Qualitative risk analysis**

**Strategic risk analysis**
Redesigning the energy-efficiency barriers concept:

- **Hidden** Barrier
  - Cultural dimension
  - No strategic character

- **Real** Barrier
  - Hidden costs
  - Information
  - Access to capital
  - Risk, etc.

- **Symptom** Barriers
  - Information

- **Base** Barrier
  - Hidden costs
  - Access to capital
  - Risk, etc.
Non-energy / multiple benefits:

- Can make energy issues strategic
- they have to be analyzed ex ante (i.e. before projects start)
- They have to be communicated in a convincing way to stakeholders
References

References