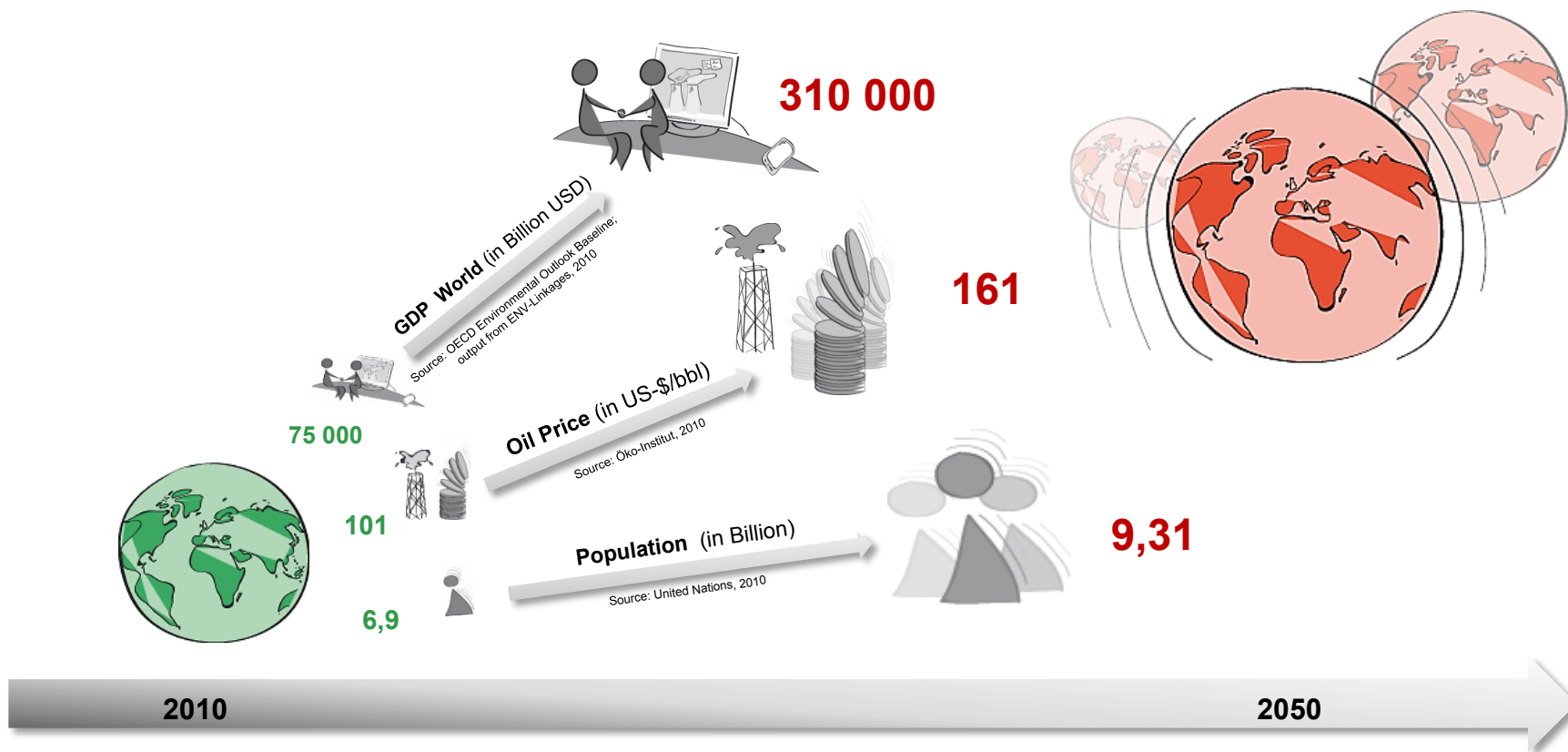
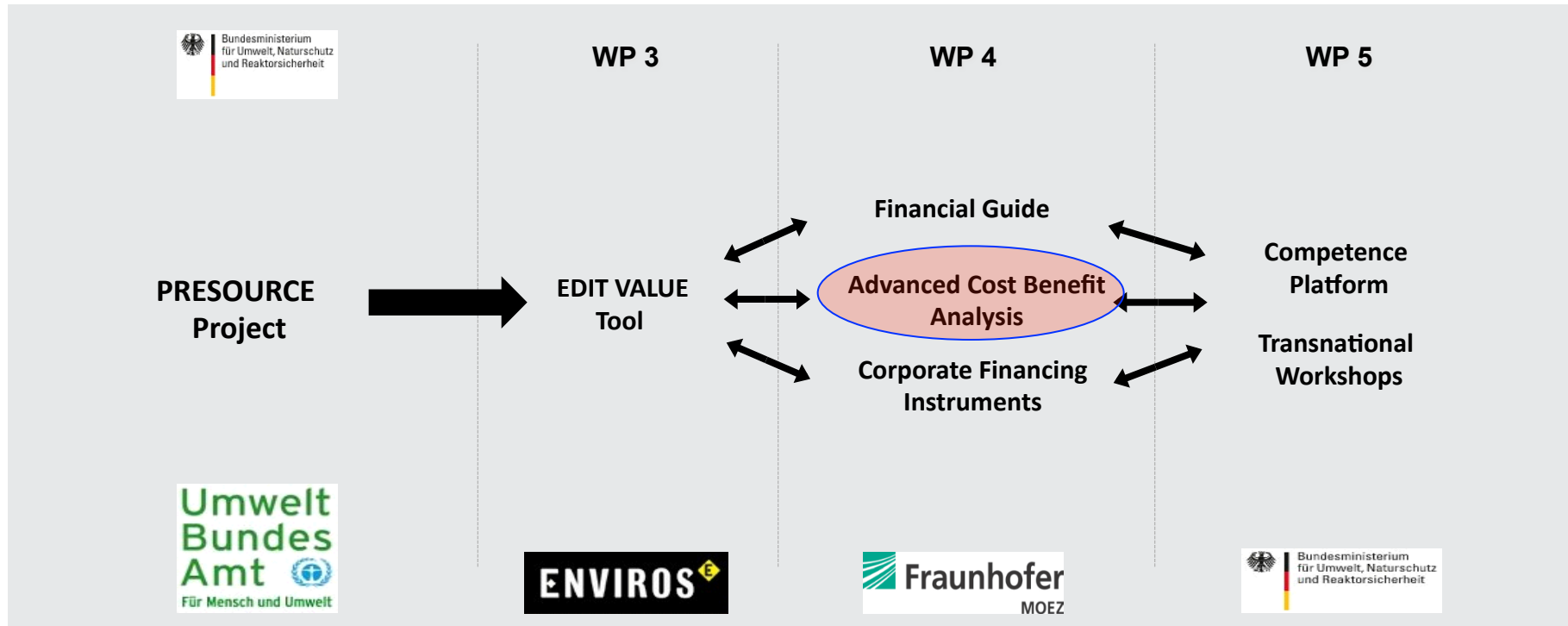


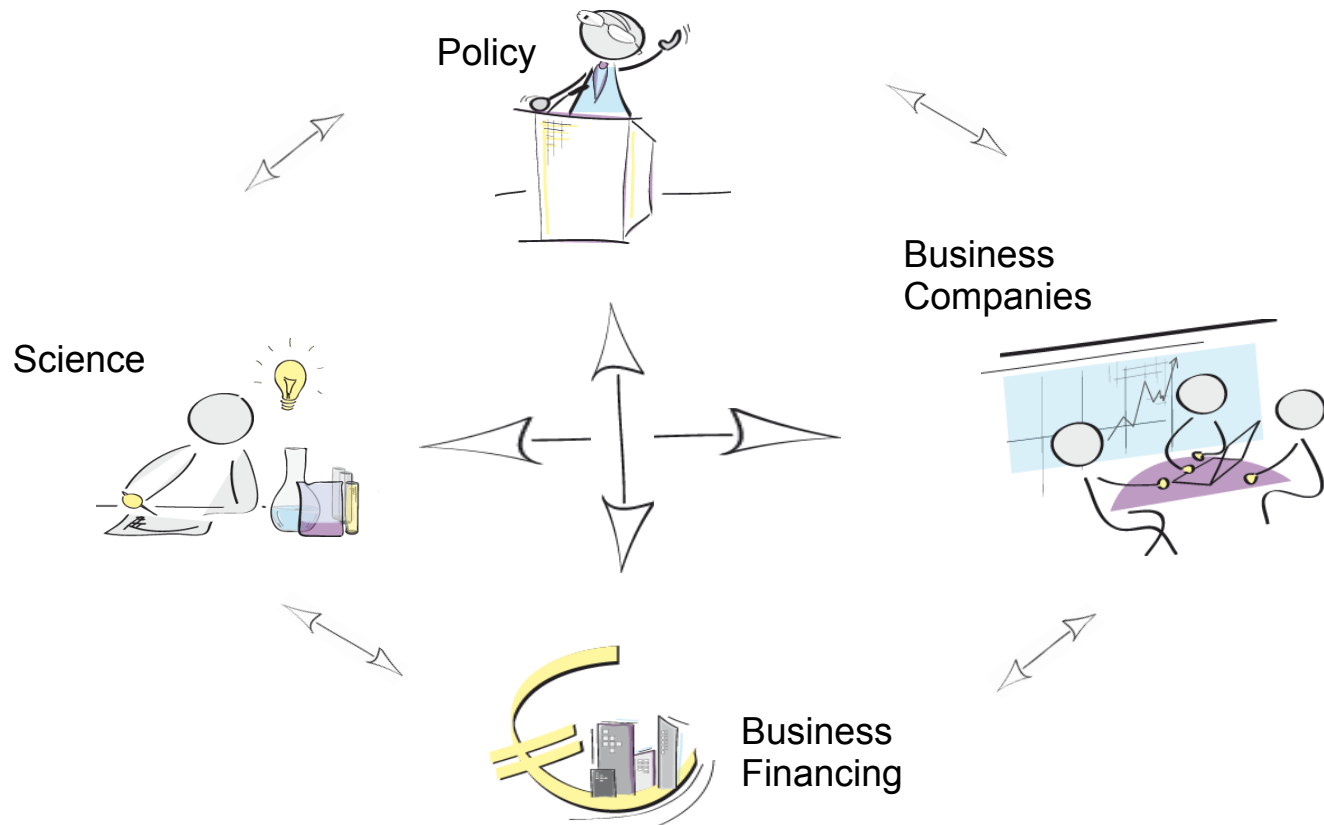
Advanced Cost Benefit Analysis: methodology and benefits for SMEs

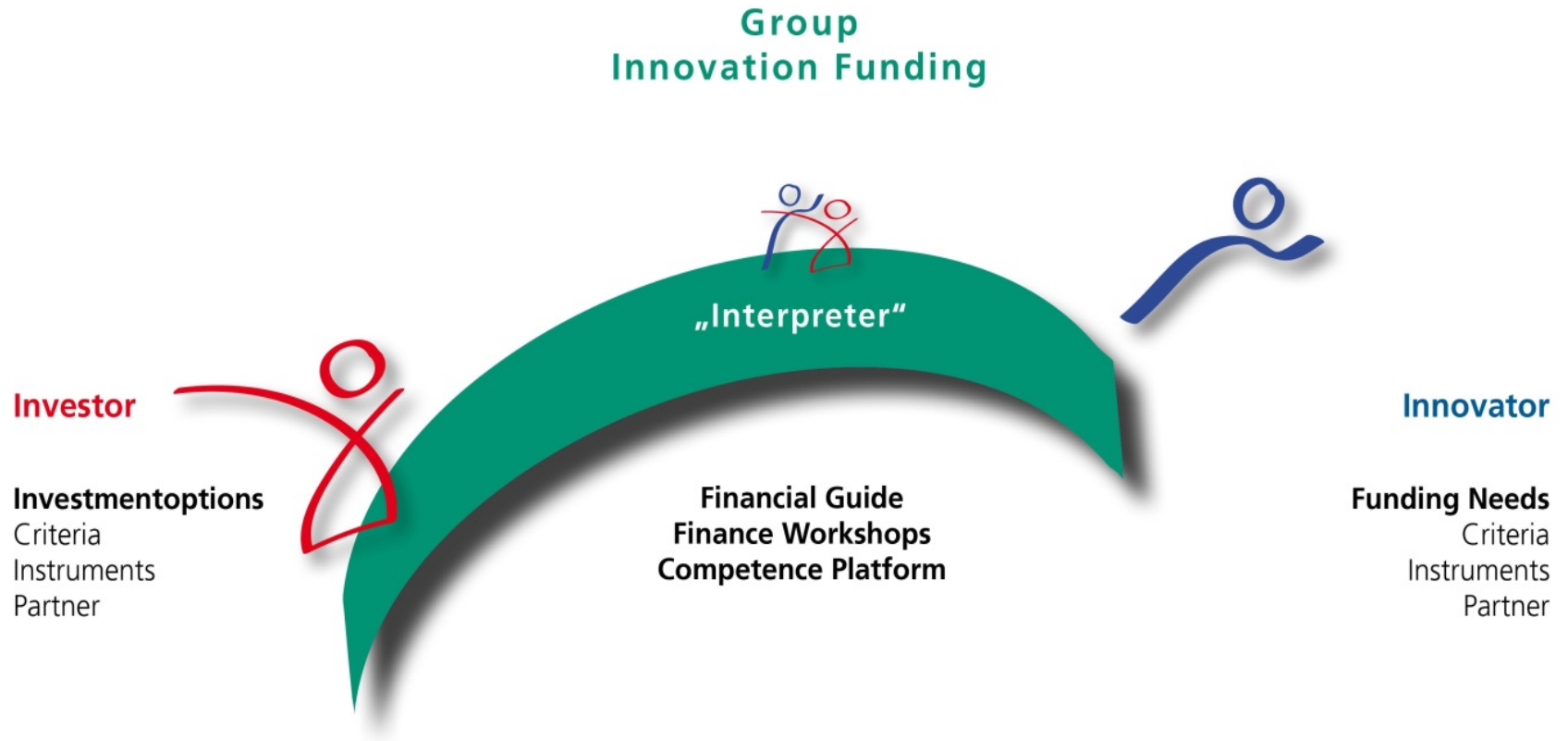
Jens Rockel
Dominik Palsa

Bologna, 18 September 2014









➡ > 100 interviews with financial stakeholders in AT, CZ, HU, IT, PL and GER

- *Information asymmetry between innovators and capital providers*
- *Intransparency regarding relevant actors and tailored instruments*
- *Economic valuation problem of resource efficiency potential*
- *Lack of measurable indicators (resource efficiency vs. eco-innovation)*
- *Good-practice examples and transnational success stories are missing*



Common understanding of measurable indicators is needed

PRESURCE

Advanced Cost Benefit Analysis 4.2

Advanced Cost Benefit Analysis of investments in
resource efficiency measures - A guide for SMEs
seeking for external funding

Dominik Palsa

Fraunhofer MOEZ



Problem

- Measures for eco-innovation/RE face a high level uncertainty about their economic feasibility
- Lack of valuation criteria for RE investments
= imperfect market conditions



Necessity for a comprehensive tool to optimize the decision-making processes of RE-investments



Solution

Development of an easy to use indicator system and tool for SMEs seeking for external funding

- Soft indicators
- Environmental indicators
- Economic indicators

Soft Indicators

= Upfront Qualitative Checklist Scheme

- Provides a qualitative overview of the general environmental impact:
 - Managerial decisions,
 - Eco-certifications / ecolabels,
 - EMSs,
 - etc.

Qualitative Checklist for SMEs

1. General sustainable impact

- ☐ Sustainability as a management objective (e.g. an assigned project manager for eco-innovations)
- ☐ Integration of a Life Cycle Assessment (ISO 14040 and 14044)
- ☐ Other _____

2. Implementation of organizational eco-certification

- ☐ Environmental Management System (ISO 14001:2004)
- ☐ Eco-Management and audit scheme (EMAS 2009/1221/CE)
- ☐ Carbon Footprint (ISO 14064:2012)
- ☐ Organization Environmental Footprint (OEF) (currently under development)

3. Implementation of product / process eco-certification

- ☐ Ecolabel type I (ISO 14024:2001)
- ☐ Ecolabel type II (ISO 14021:2012)
- ☐ Ecolabel type II (ISO 14025:2010)
- ☐ Carbon Footprint (ISO 14067:2013)
- ☐ Water Footprint (ISO 14067:2013)
- ☐ Product Environmental Footprint (PEF) (currently under development)

4. Cost reduction of natural resources

- ☐ Introduction of a circular economy system
- ☐ Improvement of energy, material and/or water conservation
- ☐ Usage of secondary resources
- ☐ Other _____

5. Reduction of environmental impact

- ☐ Reduction of greenhouse gases emissions
- ☐ Improvement of waste management
- ☐ Introduction of recycling and/or reuse measures
- ☐ Measures for soil, water and/or air protection
- ☐ Substitution of hazardous material
- ☐ Other _____

Environmental Indicators

- Overview of a SMEs environmental status and performance
- Comparison possible with estimated project targets and SME benchmarks

Environmental Indicators

Input	Indicator	Project target
Non-renewable materials intensity	..... (t / year)	..... (t / year)
Restricted substances intensity	..... (t / year)	..... (t / year)
Recycled / reused content (%) (%)
Operations		
Water intensity	..... (m ³ / year)	..... (m ³ / year)
Energy intensity	..... (MJ / year)	..... (MJ / year)
Renewable proportion of energy (%) (%)
Greenhouse gas intensity	..... (tCO ₂ e / year)	..... (tCO ₂ e / year)
Products (indicators are linked to each)		
Recycled / reused content (%) (%)
Renewable materials content (%) (%)
Target value of total material input	..... (t / year)	..... (t / year)
Energy consumption intensity	..... (MJ / year)	..... (MJ / year)

1) Input

e.g. non-renewable materials intensity (t / year)

*Weight of non-renewable resources consumed
/ Normalisation factor*

Indicator

Project target

.....(t / year)

..... (t / year)

2) Operations

e.g. water intensity (m³ / year)

Total water intake / Normalisation factor

Indicator

Project target

.....(m³/year)

..... (m³/year)

3) Products (indicators linked to each product)

e.g. recycled / reused content

Sum for each product {(Weight of a product unit x Proportion of recycled content x Units produced) + (Weight of a product unit x Proportion of reused content x Units produced)}
/ Sum for each product (Weight of a product unit x Units produced)
x100

Indicator

Project target

.....(%)

..... (%)

Economic Indicators

Evaluation alongside the three layers of the PRESOURCE-Definition of RE:

Energy, Water and Material

Development of an Investment Analysis Tool for RE-investments utilisable by SMEs

Financial evaluation of RE investment projects:

Net Present Value (NPV)
Pay Back Period (PBP)
Internal Rate of Return (IRR)
Return on Investment (ROI)

Scenario Analysis of Eco-Innovation Investments

	Status Quo	Scenario 1 Energy, water and process optimisation	Scenario 2 Improved energy, water and process optimisation
Energy¹⁷			
Energy consumption	500,000 kWh / year	400,000 kWh / year	380,000 kWh / year
Total value of energy costs	93,950 € / year	75,160 € / year	71,402 € / year
Optimisation potential		25.00 %	31.58 %
Costs of related maintenance		2,000 € / year	2,000 € / year
Total cost saving potential		16,790 € / year	20,548 € / year
Water¹⁸			
Water consumption	50,000 m³ / year	40,000 m³ / year	40,000 m³ / year
Total value of water costs	83,500 € / year	66,800 € / year	66,800 € / year
Optimisation potential		25.00 %	25.00 %
Costs of related maintenance		3,000 € / year	3,000 € / year
Total cost saving potential		13,700 € / year	13,700 € / year
Material			
Total material input	500,000 € / year	470,000 € / year	450,000 € / year
Optimisation potential		6.38 %	11.11 %
Costs of related maintenance		3,500 € / year	4,500 € / year
Total cost saving potential		26,500 € / year	45,500 € / year
Additional net profits			
Through production optimisation		15,500 € / year	21,500 € / year
Through process optimisation		8,000 € / year	13,000 € / year
Through recycling/reuse measures		0 € / year	0 € / year
Other cost savings (e.g. cost of emissions, pollution, waste)		0 € / year	0 € / year
Investment Summary			
Investment costs	200,000 €	350,000 €	
Useful economic life	5 years	7 years	
Net present value (NPV) over economic life cycle ¹⁹	148,480 €	311,082 €	
Pay Back Period (PBP)	2.48 years	3.06 years	
Internal Rate of Return (IRR)	23 %	20 %	
Return On Investment (ROI)	74.2 %	88.9 %	

Outlook

- + Dynamic values to increase analysis depth
 - > e.g. increase of costs per year
- + Validation by the market and further improvement
 - > Follow-up project

Advanced Cost Benefit Analysis

PROMOTION OF RESOURCE EFFICIENCY
IN SMEs IN CENTRAL EUROPE

Information and Background

One of the core outputs of the EU-project PRESOURCE is a transnational tool to promote and implement an Advanced Cost Benefit Analysis. It was developed to foster investment decisions in the field of eco-innovation and resource efficiency. Small and medium sized enterprises (SMEs) receive a comprehensive tool that helps them address their investment proposals to capital providers. This is expected to result in a quality increase in the eco-innovation funding process and to foster the exploitation of eco-innovation gains.

PRESOURCE is implemented through the CENTRAL EUROPE Programme co-financed by the ERDF and aims to increase resource efficiency, especially in SMEs in the Central European countries, by identifying opportunities for improving and financing investment in eco-innovation.

Resource efficiency is understood as "reducing the use and the costs of energy, material and water in the production process and product life cycle". However, in the context of the Advanced Cost Benefit Analysis the focus was broadened to eco-innovation as a whole. According to the European Commission, eco-innovation is "any form of innovation aiming at significant and demonstrable progress towards the goal of sustainable development [...] by reducing the environmental impact or achieving efficient and responsible use of resources".

Eco-innovation and resource efficiency are confirmed by over 100 transnational experts from public financial institutions, specialists and innovative capital markets. Eco-innovation and resource efficiency approaches are used in other countries (Austria, Italy and Poland). These approaches are environmental values. Thus, the cost due to the loss of benefit through the loss of high quality products is high.

The tool is available through www.presource.eu and efficiencyatlus.eu.

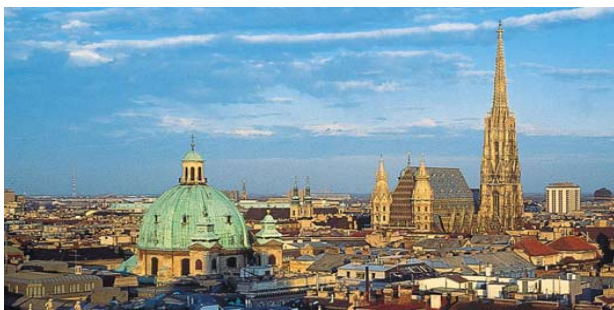
Scenario and Investment Analysis Tool for Eco-Innovations

	Status Quo	Scenario 1 Energy, water and process optimization	Scenario 2 Improved energy, water and process optimization
Energy			
Amount of energy consumption (MWh / year)	500,000	400,000	380,000
Total value of energy costs (€ / year)	80,000	75,160	71,400
Optimization potential (%)		25.00	31.50
Costs of related maintenance (€ / year)	2,000	2,000	2,000
Total cost saving potential		16,790	20,540
Water			
Amount of water consumption (m³ / year)	50,000	40,000	40,000
Total value of water costs (€ / year)	80,000	66,800	66,800
Optimization potential (%)		25.00	25.00
Costs of related maintenance (€ / year)	3,000	3,000	3,000
Total cost saving potential		13,700	13,700
Material			
Value of total material input (year)	500,000	470,000	450,000
Optimization potential (%)		6.36	11.11
Costs of related maintenance (€ / year)	3,500	3,500	3,500
Total cost saving potential (€ / year)		28,500	45,000
Additional net profits			
Through production optimization (€ / year)		10,000	10,000
Through process optimization (€ / year)		5,000	10,000
Through recycling/reuse measures (€ / year)		0	0
Other cost savings (e.g. cost of emissions, pollution, waste management etc.) (€ / year)		0	0
Investment Summary			
Investment costs (€)		200,000	350,000
Useful economic life (years)		5	7
Net present value (NPV) (€)		111,679	298,111
Pay Back Period (PBP) (years)		2.78	3.34
Internal Rate of Return (IRR) (%)		17.55	16.99
Return On Investment (ROI) (%)		58.6	73.2

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	Status Quo	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
ENERGY											
Lifetime (in years)	15	1	1	1	1	1	1	1	1	1	1
Amount of energy consumption p. a. (in kWh)	500,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000
Electricity price (in C/kWh) / Increase of costs p. a.	2.30%	10.70	10.95	11.20	11.46	11.72	11.99	12.26	12.53	12.80	13.07
Total value of energy costs (in €)	53,500	42,800	43,784	44,791	45,822	46,876	47,954	49,056	50,183	51,335	52,507
Optimization amount		25,000	22,195	19,440	16,785	14,130	11,575	9,020	6,465	3,910	1,355
Costs of related maintenance (in €)		2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Net total cost savings (in €)		8,700	7,716	6,709	5,678	4,624	3,546	2,443	1,340	250	1,355
WATER											
Lifetime (in years)	8	1	1	1	1	1	1	1	1	1	1
Amount of water consumption p. a. (in m³)	50,000	44,000	44,000	44,000	44,000	44,000	44,000	44,000	44,000	44,000	44,000
Water price (in €/m³) / Increase of costs p. a.	150%	1.67	1.70	1.72	1.75	1.77	1.80	1.83	1.85	1.88	1.91
Total value of water costs (in €)	83,500	73,480	74,582	75,701	76,836	77,989	79,159	80,346	81,551	82,783	84,043
Optimization amount		13,044	11,965	10,300	8,676	7,079	5,493	3,923	2,390	850	1,355
Costs of related maintenance (in €)		4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Net total cost savings (in €)		6,020	4,918	3,799	2,664	1,511	341	(846)	(2,051)	(3,150)	(1,355)
MATERIAL											
Lifetime (in years)	10	1	1	1	1	1	1	1	1	1	1
Value of total material input p. a. (in €)	500,000	450,000	454,500	459,045	463,635	468,272	472,955	477,684	482,461	487,286	492,161
Increase of material costs p. a.	100%	11.11%	10.01%	8.92%	7.84%	6.78%	5.72%	4.67%	3.64%	2.61%	1.58%
Optimization amount		5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
Costs of related maintenance (in €)		45,000	40,500	36,955	31,365	26,728	22,045	17,316	12,533	7,750	2,967
Net total cost savings (in €)											
INVESTMENT SUMMARY											
Cashflows (CFs)		59,720	53,133	46,463	39,708	32,864	25,933	18,913	11,893	4,873	(1,355)
Discounted CFs (DCFs)		59,720	49,454	40,251	32,016	24,683	18,114	12,296	7,811	4,873	(1,355)
Cumulated DCFs / Investment costs		(140,280)	(30,828)	(50,575)	(19,560)	6,104	24,218	36,514	48,811	61,108	73,405
Sum of CFs		298,232									
Sum of DCFs		249,048									
Investment costs		200,000									
Assumed Discount rate vs. calculated WACC		7.44%									
Net Present Value (NPV)		39,330									
Return On Investment (ROI)		118.67%									
Pay Back Period (PBP)		3.35									
Dynamic PBP		7.32									

2nd Transnational Workshop on Innovative Financing Instruments



2nd Transnational Workshop on Innovative Financing Instruments

Vienna, 9 October 2014





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