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# MORE4Sustainability

Roadmap for Sustainable Asset Management - **Part 3**  
Self Assessment & Business Case tool



IN PARTNERSHIP WITH



mainnovation

Interreg



Co-funded by  
the European Union

North-West Europe

More4Sustainability



## Self Assessment & Business Case tool

As shown in the second step of the Implementation Roadmap, the aim is to create an action plan. This involves the actions that need to be carried out to meet targets on Energy Efficiency Improvement and GHG Emission Reduction.

For this purpose, the MORE4Sustainability Self Scan has been developed. Based on this Self Scan, companies can analyse their current situation and identify areas for improvement.

The Self Scan is built around the twelve focus areas of the MORE4Sustainability Framework and inventories the current implementation level of the underlying practices (see figure 2).



By comparing the current implementation level and ambition for 2030 with the implementation level of the early adopters, it becomes clear where the potential for improvement lies. To utilise this potential, actions must be identified. In the Self Scan, these actions are recorded and budgeted: what investment is needed and what happens to the annual costs?

**Download the MORE4Sustainability Self Scan by:**

- **Clicking** this green frame
- Scanning this **QR code**
- or by using the **url** below.

⇒ <https://bit.ly/M4Sdownloads>





	% Early adaptors with full implementation	Current Implementation Level	Target Implementation Level 2030	Description of action	Required Investment (€)	Additional annual costs (€)	Energy Efficiency Improvement 2030	GHG Emission Improvement 2030
<b>1.1 Plant Electrification</b>							Early Adaptors = 1,5%	Early Adaptors = 2,0%
1.1.1 Pumps	33%	0. Not Implemented	1. Pilot Implementation					
1.1.2 Compressors	40%	2. Roll out	3. Fully implemented					
1.1.3 Heating elements	40%	0. Not Implemented	3. Fully implemented					
1.1.4 Vehicles and forklifts	53%	3. Fully implemented	3. Fully implemented					
1.1.5 Other	0%	1. Pilot Implementation	2. Roll out					
<b>1.2 Sustainable Asset Replacement</b>							Early Adaptors = 5,3%	Early Adaptors = 4,9%
1.2.1 Led Lighting	67%	1. Pilot Implementation	3. Fully implemented	Replacement of all lighting by LED	100.000			
1.2.2 Smart and adaptive lighting	47%	1. Pilot Implementation	2. Roll out					
1.2.3 High-efficiency HVAC	33%	1. Pilot Implementation	3. Fully implemented					
1.2.4 High-efficiency motors and drives	60%	0. Not Implemented	2. Roll out	Replacement of 10 motors	300.000		1,0%	1,0%
1.2.5 Life extension, refurbishment and overhaul	53%	0. Not Implemented	0. Not Implemented					
1.2.6 Circularity for sustainable replacement	40%	0. Not Implemented	0. Not Implemented					
1.2.7 Other	0%	0. Not Implemented	0. Not Implemented					
<b>1.3 Production Process Reengineering</b>							Early Adaptors = 3,0%	Early Adaptors = 2,1%
1.3.1 Process optimization and redesign	53%	0. Not Implemented	0. Not Implemented					
1.3.2 Product conversion	27%	0. Not Implemented	0. Not Implemented					
1.3.3 (Partial) plant closure	7%	1. Pilot Implementation	3. Fully implemented					
1.3.4 Building (a partial) new factory	27%	1. Pilot Implementation	2. Roll out					
1.3.5 Circularity from process reengineering	13%	1. Pilot Implementation	3. Fully implemented					
1.3.6 Other	0%	0. Not Implemented	2. Roll out					
<b>2.1 Asset Energy Efficiency Care</b>							Early Adaptors = 4,3%	Early Adaptors = 3,2%
2.1.1 Regular cleaning	73%	3. Fully implemented	3. Fully implemented					
2.1.2 Lubrication	60%	1. Pilot Implementation	3. Fully implemented	New lubrication service of supplier		20.000		
2.1.3 Filter maintenance	60%	3. Fully implemented	3. Fully implemented					
2.1.4 Operator maintenance	47%	0. Not Implemented	0. Not Implemented					
2.1.5 Routine inspections	73%	3. Fully implemented	3. Fully implemented					
2.1.6 Monitor equipment settings	53%	0. Not Implemented	0. Not Implemented					
2.1.7 Other	0%	0. Not Implemented	0. Not Implemented					
<b>2.2 Predictive Maintenance</b>							Early Adaptors = 1,8%	Early Adaptors = 0,0%
2.2.1 PdM via condition monitoring	73%	1. Pilot Implementation	3. Fully implemented					
2.2.2 PdM through integrative data analysis	33%	1. Pilot Implementation	2. Roll out					
2.2.3 PdM and prescriptive maintenance	33%	1. Pilot Implementation	3. Fully implemented					
2.2.4 Other	0%	0. Not Implemented	2. Roll out					
<b>2.3 HighPrecision Maintenance</b>							Early Adaptors = 0,2%	Early Adaptors = 0,1%
2.3.1 Precision measurement	27%	0. Not Implemented	0. Not Implemented					
2.3.2 Laser accurate alignment	33%	1. Pilot Implementation	3. Fully implemented					
2.3.3 Accurate calibration of instruments	27%	1. Pilot Implementation	2. Roll out					
2.3.4 Managing high tolerances	27%	1. Pilot Implementation	3. Fully implemented					
2.3.5 Quality assurance	13%	0. Not Implemented	2. Roll out					
2.3.6 Clear maintenance instructions	33%	0. Not Implemented	0. Not Implemented					
2.3.7 Other	0%	0. Not Implemented	0. Not Implemented					
<b>3.1 Electrical Energy Optimization</b>							Early Adaptors = 4,9%	Early Adaptors = 2,0%
3.1.1 HVAC optimisation	67%	0. Not Implemented	0. Not Implemented					
3.1.2 Lighting upgrades	60%	0. Not Implemented	0. Not Implemented					
3.1.3 Motors and drives	53%	1. Pilot Implementation	3. Fully implemented					
3.1.4 Load balancing	33%	1. Pilot Implementation	2. Roll out					
3.1.5 Power factor correction	33%	1. Pilot Implementation	3. Fully implemented					
3.1.6 Other	0%	0. Not Implemented	2. Roll out					
<b>3.2 Thermal Energy Recovery &amp; Reuse</b>							Early Adaptors = 3,6%	Early Adaptors = 3,1%
3.2.1 Heat recovery systems	60%	1. Pilot Implementation	3. Fully implemented					
3.2.2 Cogeneration systems	7%	1. Pilot Implementation	2. Roll out					
3.2.3 District heating and cooling	0%	1. Pilot Implementation	3. Fully implemented					
3.2.4 Integrate industrial processes	20%	0. Not Implemented	2. Roll out					
3.2.5 Thermal storage systems	7%	0. Not Implemented	0. Not Implemented					
3.2.6 Other	0%	0. Not Implemented	0. Not Implemented					
<b>3.3 Thermal Energy Loss Prevention</b>							Early Adaptors = 2,5%	Early Adaptors = 1,9%
3.3.1 Insulation	73%	1. Pilot Implementation	3. Fully implemented					
3.3.2 Thermal imaging and infrared thermography	40%	1. Pilot Implementation	2. Roll out					
3.3.3 Temperature sensors	53%	1. Pilot Implementation	3. Fully implemented					
3.3.4 Other	0%	0. Not Implemented	2. Roll out					
<b>4.1 Fugitive Emission Prevention</b>							Early Adaptors = 0,6%	Early Adaptors = 0,6%
4.1.1 Leak detection and repair (LDAR)	20%	1. Pilot Implementation	3. Fully implemented					
4.1.2 Sealing and repair	13%	1. Pilot Implementation	2. Roll out					
4.1.3 Emission control technologies	13%	1. Pilot Implementation	3. Fully implemented					
4.1.4 Other	0%	0. Not Implemented	2. Roll out					
<b>4.2 GHG Capturing &amp; Reuse</b>							Early Adaptors = 0,0%	Early Adaptors = 0,0%
4.2.1 Capture technologies	7%	0. Not Implemented	0. Not Implemented					
4.2.2 Transport and storage	0%	1. Pilot Implementation	3. Fully implemented					
4.2.3 Use and conversion	0%	1. Pilot Implementation	2. Roll out					
4.2.4 Biological conversion	7%	1. Pilot Implementation	3. Fully implemented					
4.2.5 Other	0%	0. Not Implemented	2. Roll out					
<b>4.3 Renewable Energy Generation</b>							Early Adaptors = 3,3%	Early Adaptors = 7,4%
4.3.1 Solar energy systems	67%	1. Pilot Implementation	3. Fully implemented					
4.3.2 Wind energy systems	47%	1. Pilot Implementation	2. Roll out					
4.3.3 Biomass energy systems	13%	1. Pilot Implementation	3. Fully implemented					
4.3.4 Geothermal energy systems	13%	0. Not Implemented	2. Roll out					
4.3.5 Other	0%	0. Not Implemented	0. Not Implemented					
<b>Total</b>							Early Adaptors = 31,1%	Early Adaptors = 28%
<b>Total action plan - Focus Areas</b>					400.000	20.000	2,0%	2,0%

Figure 1 | Screenshot of the MORE4Sustainability Self Scan, tab "Focus Areas".

### Example of a business case calculation

A factory with a replacement value of € 300M and a maintenance budget of € 6M has the following energy consumption:

• <b>Gas</b>	9,000,000 m <sup>3</sup> x € 0.75/m <sup>3</sup>	=	€ 6,750,000
• <b>Electricity</b>	10,000,000 kWh x € 0.23/kWh	=	€ 2,300,000
• <b>Total</b>		=	€ 9,050,000

Based on this energy consumption, the CO<sub>2</sub> emissions would be (see figure 2):

• <b>Gas</b>	9,000,000 m <sup>3</sup> x 0.0017 ton CO <sub>2</sub> /m <sup>3</sup> =	15,300 ton CO <sub>2</sub>
• <b>Electricity</b>	10,000,000 kwh x 0.0007 ton CO <sub>2</sub> /kwh =	7,000 ton CO <sub>2</sub>
• <b>Total</b>	=	22,300 ton CO <sub>2</sub>

The total cost of CO<sub>2</sub> emissions is:

$$22,300 \text{ ton CO}_2 \times € 68/\text{ton CO}_2 = € 1,516,400$$

The company has drawn up an action plan delivering 2% energy efficiency and 2% reduction in GHG emissions by 2030 (see figure 1). The annual savings are calculated as:

• <b>Energy Efficiency</b>	2% x € 9,050,000	=	€ 181,000
• <b>GHG Emission Reduction</b>	2% x € 1,393,388	=	€ 27,878
• <b>Total</b>		=	€ 208,868

The action plan is budgeted as follows:

• <b>One-time investment:</b> new motors and LED lighting	=	€ 400,000
• <b>Additional yearly costs:</b> new lubrication program	=	€ 20,000

The business case thus becomes:

• <b>Return on Investment</b>	=	48%
• <b>Net Present Value</b> (10 years, 5% discount rate)	=	€ 1,077,384
• <b>Pay Back Period</b>	=	2 years

From the above ratio analysis it can be concluded that the investment is profitable (ROI = 48%), creates positive value (NPV = € 1,077,384) and is recouped in two years (PBP = 2 years). The project is approved for implementation.

Note: this calculation example assumes 2% improvement in energy efficiency and 2% reduction in GHG emissions. Figure 1.8 shows that the actual improvement potential within companies is often much higher: 31% and 27% on average.

Energy Consumption	Amount	Unit	Price/unit (€)	Costs (€)	ton CO <sub>2</sub> -eq / unit	ton CO <sub>2</sub> -eq
Fossil Fuels						
Natural Gas	9.000.000	m3	0,75		0,00209	
Green / Renewable Gas		m3			0,00038	
Petrol		l		-	0,00285	-
Diesel		l		-	0,00302	-
Liquefied petroleum gas (LPG)		l		6.750.000	0,00170	15.300
Compressed natural gas (CNG)		kg		-	0,00287	-
Ethanol E85		l		-	0,00106	-
Biodiesel (B100)		l		-	0,00144	-
Coal		kg		-	0,00234	-
Electricity						
Grey Electricity	10.000.000	kWh	0,23	2.300.000	0,00070	7.000
Green Electricity		kWh		-	0,00005	-

Figure 2 | Screenshot of the MORE4Sustainability Self Scan, tab "Energy Consumption".



# Acknowledgement

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**Interreg**



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the European Union

**North-West Europe**

**More4Sustainability**



⇒ Project website: [more4sustainability.nweurope.eu](https://more4sustainability.nweurope.eu)

## Lead partner organisation



Belgian Maintenance Association

⇒ [www.bemas.org](https://www.bemas.org)

## Project partner and leading the execution

**mainnovation**

Consultancy firm and experienced research agency

⇒ [www.mainnovation.com](https://www.mainnovation.com)

## Project partners



Dutch Society for  
Purposeful Maintenance

⇒ [www.nvdo.nl](https://www.nvdo.nl)



EMC2 Competitiveness Cluster

⇒ [www.pole-emc2.fr](https://www.pole-emc2.fr)



Forum Vision Maintenance

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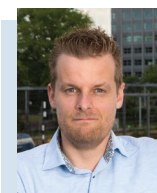
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