

Sustainable Asset Management Data Evaluation - Edalis

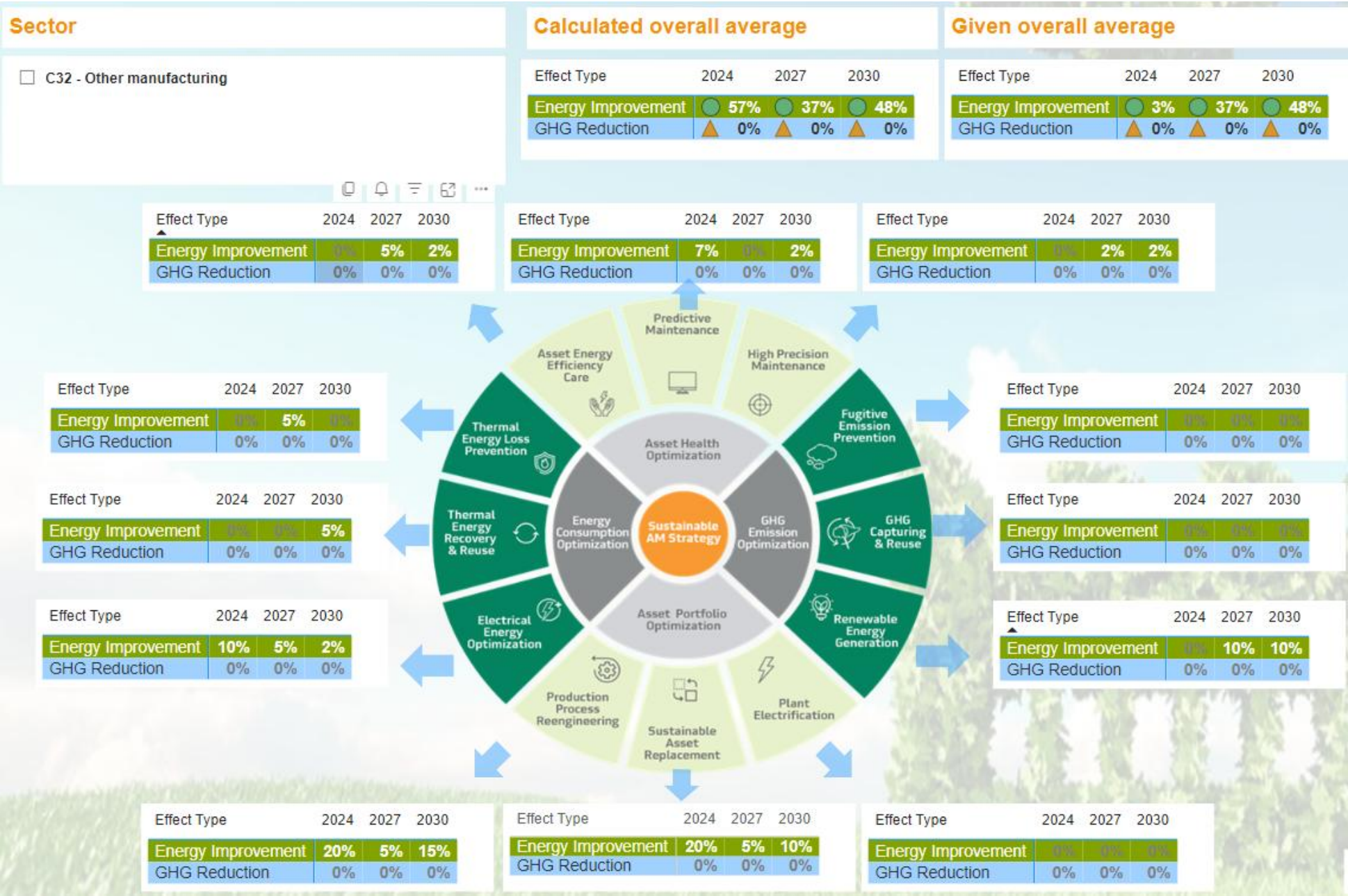
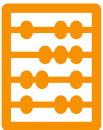


January 21st, 2025

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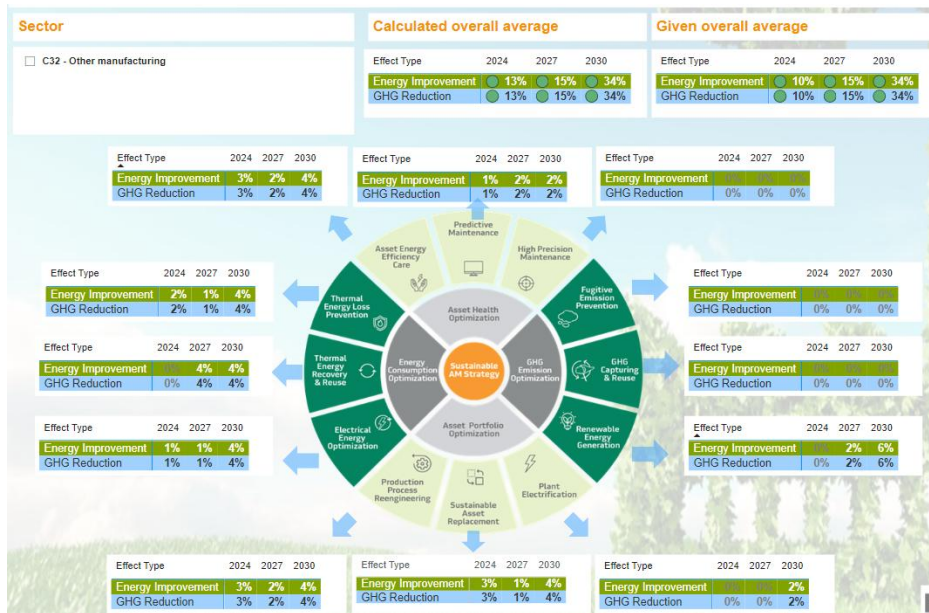
Edalis - Improvement Level Figures



Edalis - Reviews

Improvement Level Figures

- Check if the figure of the previous period per element is added to the next period
 - 1% | (1+2) 3% | (3+3) 6% |
- Check the cumulative figures over the Period
- Check the some of the figures over the 3 Periods
- Check if the some per period for Energy Improvement = GHG reduction improvement



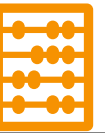
Level of implementation

Evaluation interview

During the evaluation, we will focus in particular on the following components:

- **2A t/m 3F:** Expected improvement rates from the survey. We will present the results and look at:
 - The Summation of the Percentage Numbers by Period
 - The Summation of the Percentage Numbers Over 2 and 3 Periods
 - Or the sum of the [Energy Improvement] = [GHG reduction improvement]
- **4A t/m 20B:** Implementation rate from the survey. We will present the results and look at:
 - The relationship between deployments and the highlighted themes by percentages
- Based on an implementation, we may discuss whether a business case about a best practice can be used.

Edalis - Improvement Level Figures Review



Appointed Improvement Figures per Perion per element

EDALIS					1- Asset Portfolio Optimisation			2- Asset Health Optimisation			3- Energy Consumption Optimisation			4- GHG Emission Optimisation		
			7	8	9	10	11	12	13	14	15	16	17	18	19	20
Consumption Type	Step	Periode	Consumption	Sum	1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	3.3	4.1	4.2	4.3
					Plant Electrification	Sustainable Asset Replacement	Production Process Reengineering	Asset Energy Efficiency Care	Predictive Maintenance	High Precision Maintenance	Electrical Energy Optimization	Thermal Energy Recovery & Reuse	Thermal Energy Loss Prevention	Fugitive Emission Prevention	GHG Capturing & Reuse	Renewable Energy Generation
Energy Improvement	1	2024	3%	57%	0%	20%	20%	0%	7%	0%	10%	0%	0%	0%	0%	0%
Energy Improvement	1	2027	37%	37%	0%	5%	5%	5%	0%	2%	5%	0%	5%	0%	0%	10%
Energy Improvement	1	2030	48%	48%	0%	10%	15%	2%	2%	2%	2%	5%	0%	0%	0%	10%
Energy Improvement	2	2024				1%	1%	0%	1%		0%					
Energy Improvement	2	2027						5%								
Energy Improvement	2	2030						7%								
GHG Reduction	1	2024	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
GHG Reduction	1	2027	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
GHG Reduction	1	2030	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
GHG Reduction	2	2024														
GHG Reduction	2	2027														
GHG Reduction	2	2030														

Remarks

- Do you mean with a positive number an improvement (i.e. 3% means 3% less energy used, -3% means 3% more energy used)?
- The improvement on energy efficiency in 2024 is 3%, but the underlying improvements of the 12 areas sums up to 57%. What is the correct answer
- Are the given improvements on energy efficiency for 2027 and 2030 cumulated compared to 2020? So, the improvement of 2027 is part of the improvement realised in 2030?
- How come, that the improvements on elements 2.1, 3.1 and 3.3 decrease in time. You should expect a grow of the improvements.
- Is there no GHG-reduction foreseen related to the improvements of the energy efficiency? With a reduction in energy consumption, it is expected that the emission of CO2 for generating energy on the plant will also decrease (only 1% of total energy consumption is gas (heating), the rest is electricity > no GHG-reduction foreseen)

0- Sustainable Asset Management Strategy - Level of implementation



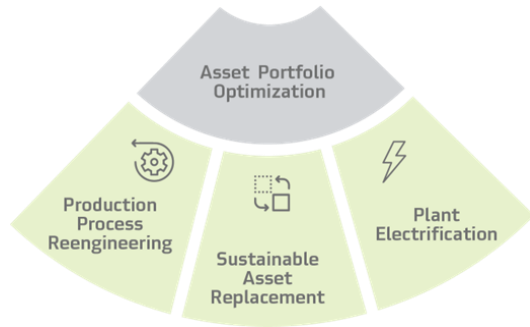
0 Sustainable Asset Management Strategy

		2023	2027	2030
1	Alignment of mission, vision and values	Partiellement	Entièrement	Entièrement
2	Sustainability culture	Partiellement	Entièrement	Entièrement
3	(Legal) Compliance and Standards	Partiellement	Entièrement	Entièrement
4	Performance measurement and Reporting	Pilote	Entièrement	Entièrement
5	Other 1	0	0	0
6	Other 2	0	0	0

Remarks

1. Which practices did you already implement or are you going to implement up to 2030?
2. 2024: start of Gemstone-program. Strategic plan created for decarbonation, ESG, eco-conception-strategy. From 2025 this will be implemented.
3. Recuperate energy from heat section, solarization of the building. During Covid-period and after that period this was not feasible to implement (financial impact of Covid crisis). Know it becomes feasible from 2025 on.
4. Edalis started with sustainable AM strategy and from that point on started to define and implement practices to reduce energy consumption.
5. Motivations:
 - People and planet perspective
 - Positioning of company (sustainability attracts)
 - CSRD to be adapted in near future
 - Increasing energy prices in 2023-2024 > affecting the profit of the company
 - CEO is sustainability minded

1- Asset Portfolio Optimisation - Level of implementation



1.1	1.2	1.3
Plant Electrification	Sustainable Asset Replacement	Production Process Reengineering
0%	20%	20%
0%	5%	5%
0%	10%	15%

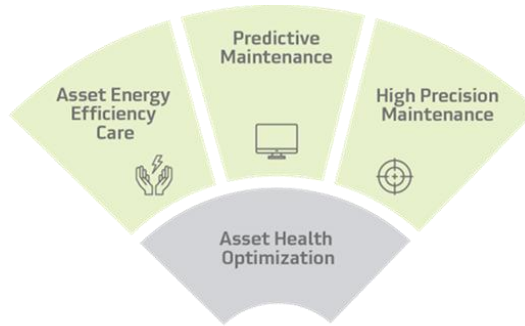
1 Asset Portfolio Optimisation				
	2023	2027	2030	
1:ISO 55000 standard for Asset Management	0	0	0	
2:Asset Portfolio Management auxiliary systems	Pilote	Partiellement	Entièrement	
3:Artificial Intelligence for Asset Portfolio Optimisation	0	Pilote	Partiellement	
4:Training employees for Asset Portfolio Optimisation	0	Pilote	Partiellement	
5:Asset Portfolio Optimisation Process	Pilote	Partiellement	Entièrement	
6:Other 1	0	0	0	
7:Other 2	0	0	0	
1.1 Plant Electrification				
	2023	2027	2030	
1:Electric pumps	0	0	0	
2:Electric compressors	Entièrement	Entièrement	Entièrement	
3:Electric fans				
4:Electric heating elements	Partiellement	Partiellement	Entièrement	
5:Electric vehicles and forklifts	Pilote	Partiellement	Entièrement	
6:Other 1	0	0	0	
7:Other 2	0	0	0	
8:Other 3	0	0	0	
1.2 Sustainable Asset Replacement				
	2023	2027	2030	
1:LED lighting:	Partiellement	Entièrement	Entièrement	
2:Smart and adaptive lighting:	Partiellement	Partiellement	Entièrement	
3:High-efficiency HVAC:	Partiellement	Partiellement	Entièrement	
4:High-efficiency motors and drives:	Entièrement	Entièrement	Entièrement	
5:Life extension, refurbishment and overhaul:	Entièrement	Entièrement	Entièrement	
6:Circularity:	Partiellement	Entièrement	Entièrement	
7:Other 1	Partiellement	Entièrement	0	
8:Other 2	0	0	0	
9:Other 3	0	0	0	
1.3 Production Process Reengineering				
	2023	2027	2030	
1:Process optimisation and redesign	Partiellement	Entièrement	Entièrement	
2:Product conversion	Partiellement	Partiellement	Partiellement	
3:(Partial) Plant Closure	Entièrement	Entièrement	Entièrement	
4:Building (a partial) new factory:	0	Partiellement	Entièrement	
5:Circularity	Partiellement	Partiellement	Entièrement	
6:Other 1	0	0	0	
7:Other 2	0	0	0	
8:Other 3	0	0	0	

Remarks

- Which dedicated system(s) are you going to implement for Asset Portfolio Management?
 - DIVA-program (EU-program for using AI in a safe way)
 - Period up tot 2024 was used to create KPI's (based on ISO) and from 2025 to follow up and manage performances (i.e. electricity consumption)
 - No GMAO in place.
- For 1.1 Plant Electrification no energy improvement has been set, but you have implemented different practices. Can you explain?
- Production Process Re-engineering and Sustainable asset replacement will have the most impact
- Items of 1.1: lack of data to analyze the possible impact
 - Items of 1.2: most have been implemented in the past (before 2020)
 - Most 'striking' practices will be on 1.3



2- Asset Health Optimisation - Level of implementation



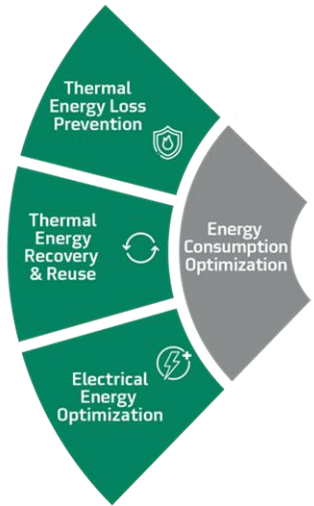
2.1	2.2	2.3
Asset Energy Efficiency Care	Predictive Maintenance	High Precision Maintenance
0%	7%	0%
5%	0%	2%
2%	2%	2%

2 Asset Health Optimisation		2023	2027	2030
1	ISO 18436 standard for condition monitoring and diagnosis of machinery	0	Pilote	Entièrement
2	Tooling for Real Time Condition Monitoring	0	0	0
3	Artificial intelligence for Asset Health Optimisation	0	Pilote	Partiellement
4	Training employees for Asset Health Optimisation	Entièrement	Entièrement	Entièrement
5	Asset Health Optimisation Processes	Pilote	Partiellement	Entièrement
6	Other 1	0	0	0
7	Other 2	0	0	0
2.1 Asset Energy Efficiency Care				
		2023	2027	2030
1	Regular cleaning	Entièrement	Entièrement	Entièrement
2	Lubrication	Entièrement	Entièrement	Entièrement
3	Filter maintenance	Entièrement	Entièrement	Entièrement
4	Operator maintenance	Entièrement	Entièrement	Entièrement
5	Routine inspections	Entièrement	Entièrement	Entièrement
6	Monitor equipment settings	Entièrement	Entièrement	Entièrement
7	Other 1	0	0	0
8	Other 2	0	0	0
9	Other 3	0	0	0
2.2 Predictive maintenance				
		2023	2027	2030
1	Predictive maintenance via condition monitoring:	Pilote	Partiellement	Entièrement
2	Predictive maintenance through Integrative Data Analysis (IDA) and predictive analytics	Pilote	Partiellement	Entièrement
3	Prescriptive maintenance:	0	Pilote	Entièrement
4	Other 1	0	0	0
5	Other 2	0	0	0
6	Other 3	0	0	0
2.3 High Precision Maintenance				
		2023	2027	2030
1	Precision measurements	Pilote	Partiellement	Entièrement
2	Laser accurate alignment	Entièrement	Entièrement	Entièrement
3	Accurate calibration of instruments	Entièrement	Entièrement	Entièrement
4	Managing tight tolerances	Entièrement	Entièrement	Entièrement
5	Quality assurance	Entièrement	Entièrement	Entièrement
6	Clear maintenance instructions	Partiellement	Entièrement	Entièrement
7	Other 1	0	0	0
8	Other 2	0	0	0
9	Other 3	0	0	0

Remarks

- How will AI help your company in terms of Asset Health Optimization?
 - Also DIVA-program will have impact
 - Item 3 of 2 (AHO) will be partiallement in stead of pilote in 2027 > impact of the DIVA-program
 - Training employees: with respect to sustainability the employees have been trained already in the past (pragmatical), but now it will be more structured and followed up
 - AHO-processes: in line with development of AI
 - On a machine the 6 inverters have been replaced by 1 new inverter causing reduction of energy consumption (sustainable asset replacement example). Soon also a condition monitoring system will be implemented to this machine (2023: pilot, 2027: partially, 2030: fully)
- How should we look at the practices of 2.1? Have they all been implemented before 2020 and therefor have no impact on energy efficiency?
 - In the past maintenance actions have already been implemented > not much energy improvement to be expected from these actions
 - KPI: internal non-compliance > to manage whether maintenance on a specific machine is up-to-date or not
- What is your case story about high precision maintenance? (2.3)
- Predictive maintenance (2.2): the expectations are that by applying a better preventive maintenance plan and better timed > assumption is that this will result in less energy usage

3- Energy Consumption Optimisation - Level of implementation



3- Energy Consumption Optimisation		
15	16	17
3.1	3.2	3.3
Electrical Energy Optimization	Thermal Energy Recovery & Reuse	Thermal Energy Loss Prevention
10%	0%	0%
5%	0%	5%
2%	5%	0%

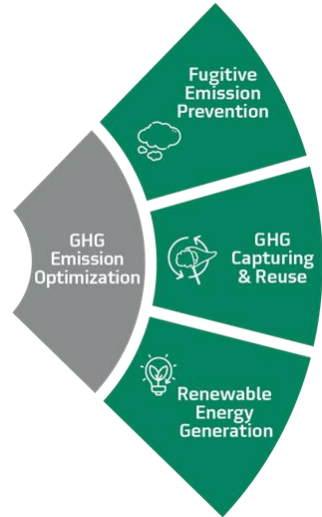
3 Energy Consumption Optimisation				
		2023	2027	2030
1	ISO 50001 energy management standard	0	Pilote	Entièrement
2	Energy management tooling	Pilote	Partiellement	Entièrement
3	Artificial intelligence for energy optimisation	0	Pilote	Entièrement
4	Staff training on energy optimisation	Partiellement	Entièrement	Entièrement
5	Energy optimisation process	0	Pilote	Entièrement
6	Other 1	0	0	0
7	Other 2	0	0	0
3.1 Electrical Energy Optimisation				
		2023	2027	2030
1	HVAC optimisation	Partiellement	Entièrement	Entièrement
2	Lighting Upgrades	Partiellement	Entièrement	Entièrement
3	Motors and drives	Partiellement	Entièrement	Entièrement
4	Load Balancing	Partiellement	Entièrement	Entièrement
5	Power Factor Correction	Partiellement	Entièrement	Entièrement
6	Other 1	0	0	0
7	Other 2	0	0	0
8	Other 3	0	0	0
3.2 Thermal Energy Recovery & Reuse				
		2023	2027	2030
1	Heat recovery systems	0	Pilote	Entièrement
2	Cogeneration systems	0	0	0
3	District heating and cooling	0	0	0
4	Integrate industrial processes	Pilote	Entièrement	Entièrement
5	Thermal storage systems	0	Pilote	Partiellement
6	Other 1	0	0	0
7	Other 2	0	0	0
8	Other 3	0	0	0
3.3 Thermal energy loss prevention				
		2023	2027	2030
1	Insulation	Entièrement	Entièrement	Entièrement
2	Thermal imaging and infrared thermography	0	0	0
3	Temperature sensors	Pilote	Partiellement	Partiellement
4	Other 1	0	0	0
5	Other 2	0	0	0
6	Other 3	0	0	0

Remarks

- How do you train your staff in terms of energy optimization? Which employees are involved?
- And how about AI?
- Which of the practices in 3.1 will have the most impact on energy efficiency?
- What are the other practices in this area of energy consumption optimization?
 - Energy mngt tooling: starting manually in 2023, digitalization of the production line will help to monitor energy consumption in the different production processes, rewrite processes and finally use of AI (DIVA)
 - Gemstone-project: lifecycle analysis will help Edalis to calculate and optimize the cost of production
 - On 3.1 they will have the best possibilities to reduce electricity consumption as the process is 100% electrical driven.
 - After 3.1 the 3.2 projects will have impact on the 3D-printing machine.



4- GHG Emission Optimisation - Level of implementation



4- GHG Emission Optimisation		
18	19	20
4.1	4.2	4.3
Fugitive Emission Prevention	GHG Capturing & Reuse	Renewable Energy Generation
0%	0%	0%
0%	0%	10%
0%	0%	10%

4 GHG Emission Optimisation				
		2023	2027	2030
1	ISO 14001 standard for environmental systems	0	0	0
2	Emission management tools	0	0	0
3	Artificial intelligence for emissions optimisation	0	0	0
4	Training employees on emission optimisation	0	0	0
5	Process for optimising greenhouse gas emissions	0	0	0
6	Other 1	0	0	0
7	Other 2	0	0	0
4.1 Fugitive Emission Prevention				
		2023	2027	2030
1	Leak detection and repair (LDAR)	0	0	0
2	Sealing and repair	0	0	0
3	Emission control technologies	0	0	0
4	Other 1	0	0	0
5	Other 2	0	0	0
6	Other 3	0	0	0
4.2 GHG Capturing & Reuse				
		2023	2027	2030
1	Capture technologies	0	0	0
2	Transport and storage	0	0	0
3	Use and conversion	0	0	0
4	Biological conversion	0	0	0
5	Other 1	0	0	0
6	Other 2	0	0	0
7	Other 3	0	0	0
4.3 Renewable Energy Generation				
		2023	2027	2030
1	Solar energy systems	0	0	0
2	Wind Energy Systems	0	0	0
3	Biomass Energy Systems	0	0	0
4	Geothermal Energy Systems	0	0	0
5	Other 1	0	0	0
6	Other 2	0	0	0
7	Other 3	0	0	0

Remarks

1. Will there be no practices implemented for 4.3 renewable energy generation? The figures on CO2-reduction will improve by 10%
 - Implementing solar panels will not result in GHG-emission reduction, but in creating electrical energy for own usage (replace purchasing electrical energy from providers) > will impact CO2-scope 3.

Main Questions for a Case



• ...