Green switching – Sustainable Product Development

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Agenda

- Cooperation with DoSyM to enhance sustainable practices
- Eaton company profile & Eaton Hengelo profile
- Sustainable Unique Selling Point
- Environmental impact of SF_6
- The alternative: Green Switching
- Sustainable product development
- Capability Maturity Model for DfE practices

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Cooperation with DoSym





















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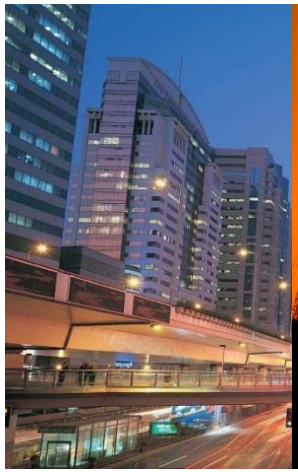
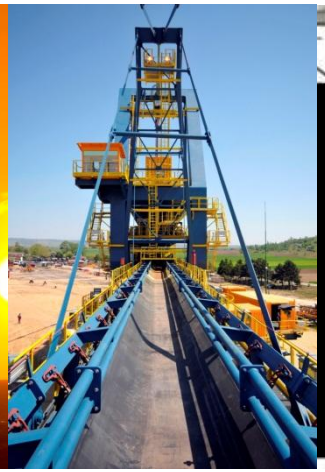
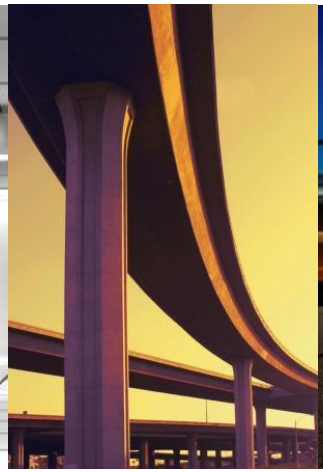
Our products and services deliver reliability, efficiency, safety and sustainability for…


Cities & Buildings


Energy & Utilities


Industrial & Machinery


Information Technology


Infrastructure


Transportation

Eaton helps bridge the gap between rapidly rising demand for energy and naturally constrained sources of supply with sustainable solutions

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Sustainable practices are leading **Eaton** to sustainable **growth**, both profitably and responsibly

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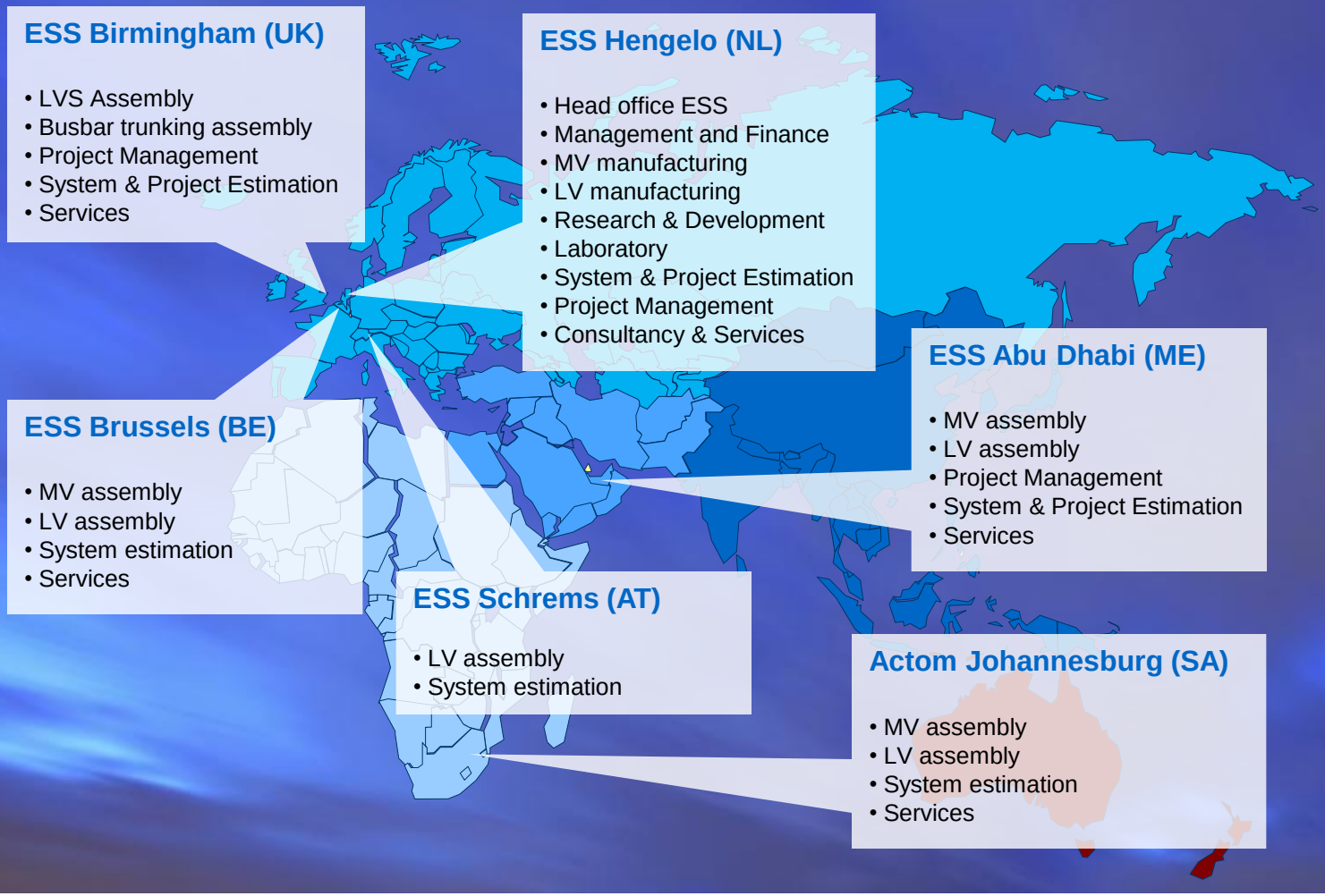
Locations - Hengelo HQ

Electrical Solutions & Services



ESS Birmingham (UK)

- LVS Assembly
- Busbar trunking assembly
- Project Management
- System & Project Estimation
- Services

ESS Hengelo (NL)

- Head office ESS
- Management and Finance
- MV manufacturing
- LV manufacturing
- Research & Development
- Laboratory
- System & Project Estimation
- Project Management
- Consultancy & Services

ESS Abu Dhabi (ME)

- MV assembly
- LV assembly
- Project Management
- System & Project Estimation
- Services

ESS Brussels (BE)

- MV assembly
- LV assembly
- System estimation
- Services

ESS Schrems (AT)

- LV assembly
- System estimation

Actom Johannesburg (SA)

- MV assembly
- LV assembly
- System estimation
- Services

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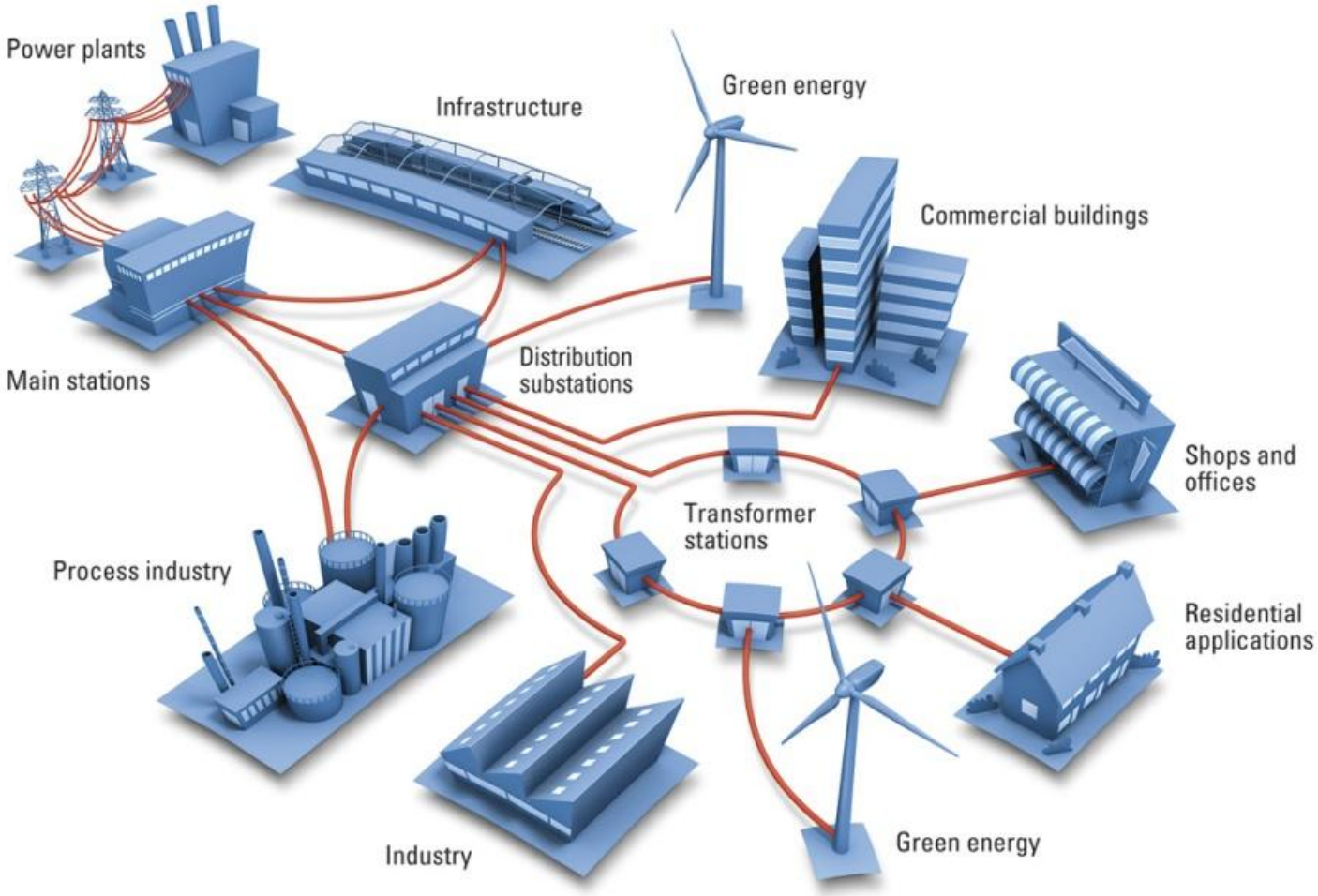
Eaton's Electrical sector in EMEA



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Sustainable unique selling point

Environmental friendly offering

- Use of minimized number of components
- Easy to adapt modular product architecture
- Universal mechanism assembly is RoHS compliant
- Circuit breaker interrupting chamber and pole unit insulation are SF_6-free

Re-use or recycle of materials

- Use of environmental friendly materials
- Encapsulated pole units are recyclable
- Cooperation with specialized partners



Efficient use of material

- Low production waste material
- Same footprint as SF_6 switchgear
- Low Watt losses during life cycle

No service checks on site

- Minimal inspection
- Environmental friendly insulation and switching medium

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SF_6 has a Global Warming Potential of **23 900** over 100 years

1 Kg SF_6 = 23 900 Kg CO_2

And there are alternatives…

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Eaton developed SF_6-free switchgear



Xiria: SF_6 free MV switchgear up to 24 kV

SF_6 free MV Switchgear

- Vacuum switching
- Solid & Air insulation

Features & benefits

- High degree of safety
- Maintenance free
- Cost-effective
- Compact
- Recyclable

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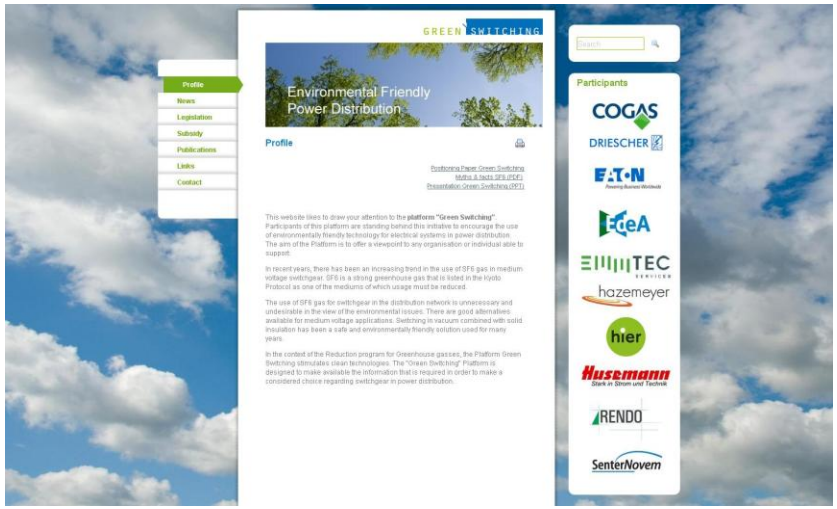
The Green Switching Initiative



The Green Switching Platform

- Participants: users, NGO's and manufacturers

Goals:

- To create awareness about SF_6 and its unnecessary use
- To stimulate the development of alternative technologies
- To promote SF_6 free technology

Website: www.greenswitching.com

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Design for Environment – Defined



Objectives:

- Position Eaton as thought leader in environmental design
- Enable Environmental Product Declarations for products
- Have a standard method within new product development for incorporating environmental attributes that differentiate Eaton products from its competitor's

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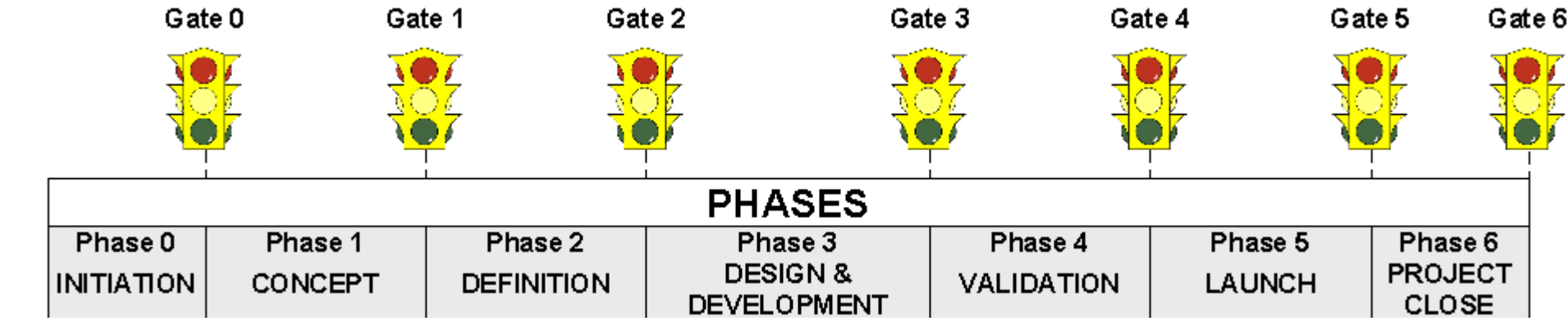
PROLaunch – Design for Environment



- Environmental opportunities in four categories: strategy and risk assessment
- Preliminary Life Cycle Profile
- Voice of Environment**
- Product and Process Environmental Targets/CTQs
- Identify concept supporting environmental targets
- Life Cycle Assessment
- Minimize impacts in Product, Component and Process Design
- Validate environmental results and compliance
- Materials Declaration
- End of Life Instruction
- Eco-Certifications
- Environmental Product Declaration
- DFE Checklist
- Capture Lessons Learned

*Voice of the Environment is a subset of the Voice of the Customer, including customer environmental requests, environmental regulations, competition, internal policy, etc

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Capability Maturity Model

Research question

How to improve Design for Environment practices at Eaton Industries (Netherlands)?

Purpose Capability Maturity Model

- Assessment of strengths and weaknesses ("as-is" assessments) – descriptive tool
- Development of a roadmap for improvement ("to-be" maturity) - prescriptive tool
- Evaluation of the company, compared to best practices of other organizations - comparative tool

Elements

- DfE practices categorized into focus areas
- Capability levels
- Maturity levels
- Assessment of current and aspired capability and maturity level

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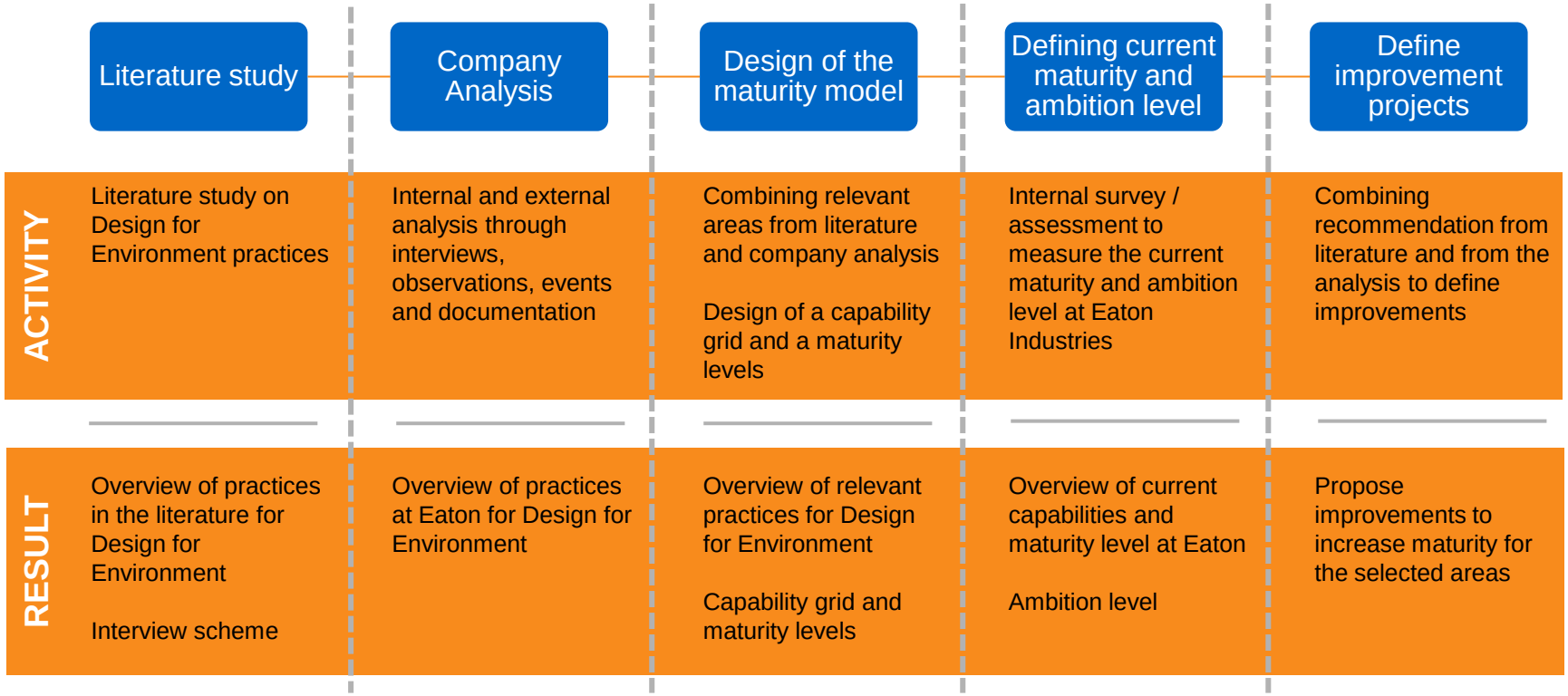
Research Design

Overview of the research design and research method



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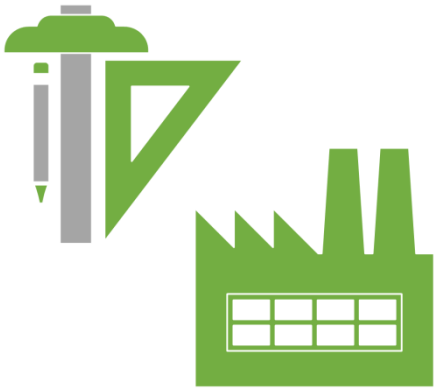
Practices (1/3)

Internal – Design focused



Practices

- Perform **external analysis**
- Formulate an environmental **vision and strategy**
- Formulate environmental **project targets**
- **Measure** the environmental performance
- Include DfE in the **normal design procedures**
- Maximize the **value proposition**

- Maximize **standardization, modularity and communality**
- Minimize **material consumption**
- Minimize **energy consumption**
- Maximize **low impact resources**
- **Lifetime** optimization

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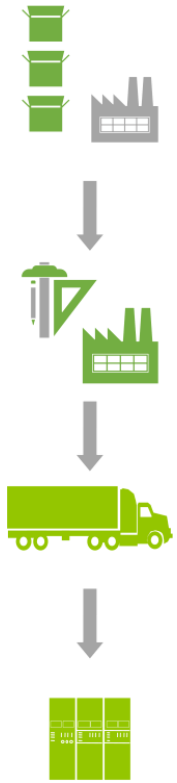
Practices (2/3)

Supply chain focused



Practices

- **Evaluate** the environmental performance throughout the life cycle
- Ensure **auditing of suppliers** on environmental performance
- Ensure **supply chain engagement and cooperation** (suppliers, distributors, customers)

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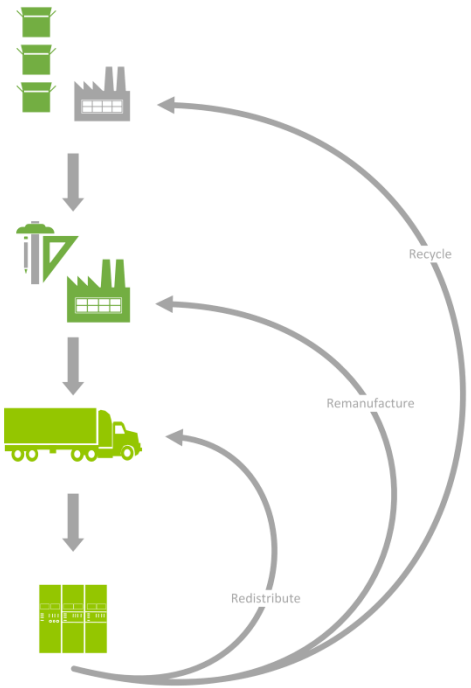
Practices (3/3)

Closing the material cycle



Practices

- Ensure **reverse logistics**
- Ensure **product ownership** at end of life
- Define a suitable **financial model**
- Maximize **re-use** (recycling, remanufacturing, refurbishment, redistribution)

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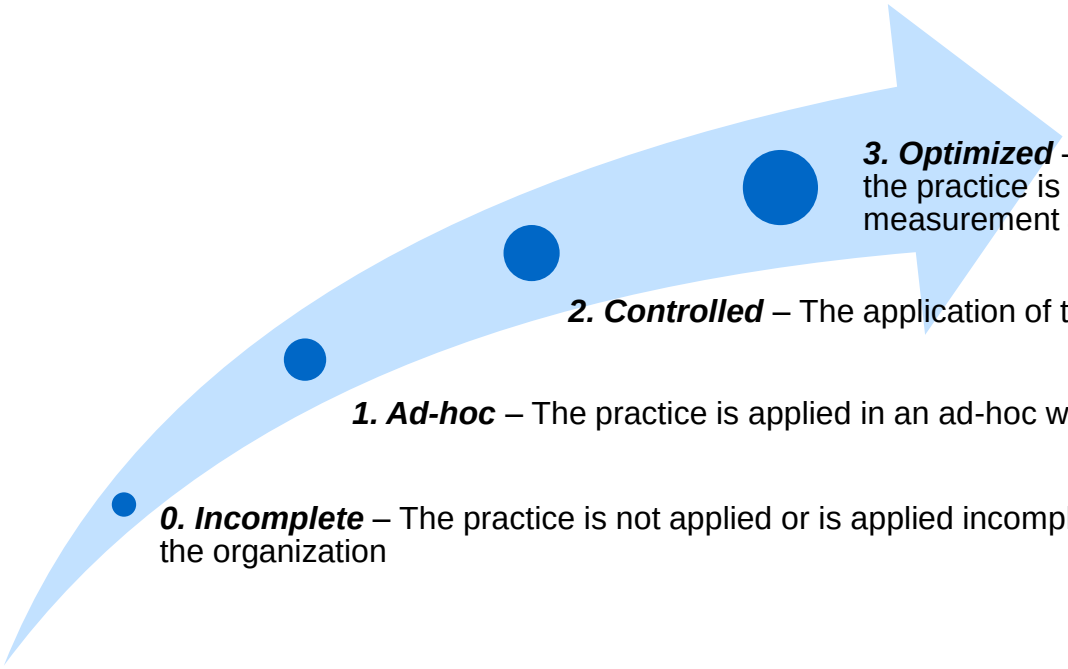
Capability levels

Capability levels



3. Optimized – The performance of the application of the practice is continuously improved based on the measurement and monitoring

2. Controlled – The application of the practice is formalized and controlled

1. Ad-hoc – The practice is applied in an ad-hoc way

0. Incomplete – The practice is not applied or is applied incompletely by the organization

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Capability levels

Metrics and parameters

Practices	Metrics	Parameters			
External analysis	*Period*	Not	Ad-hoc	Structural	Continually
	Number of items	Some	All		
	Data accessible to R&D department	Not-accessible	Accessible		
Vision and strategy	*Period*	Next generation of products	Long term innovation		
	Scope	No	Strategy	Vision	Goals, roadmap
Targets	*Period*	Not	Ad-hoc	Structural	Continually
	Level of measurement	Qualitative	Quantitative		
	Ambitious	Not ambitious	Ambitious		

Capability grid

Practices	0 - Incomplete	1 - Ad-hoc	2 - Controlled	3 - Optimized
Perform external analysis towards the environment (labels, standards, trends, competitors, customer requirements, legislation)	None	Ad-hoc on some items	Structurally and periodically at some items, ad-hoc on the other and making the analysis easily accessible to the R&D department	Continually on all items and making the analysis easily accessible to the R&D department
Formulate an environmental vision and strategy for innovation	None	Strategy for next generation of products	Vision and strategy and goals for long term innovation	Vision and strategy, goals, roadmap and tactical decisions for long term innovation
Formulate project specific environmental targets	None	Ad-hoc and qualitative	Structurally and quantitative	Continually updating, quantitative and ambitious

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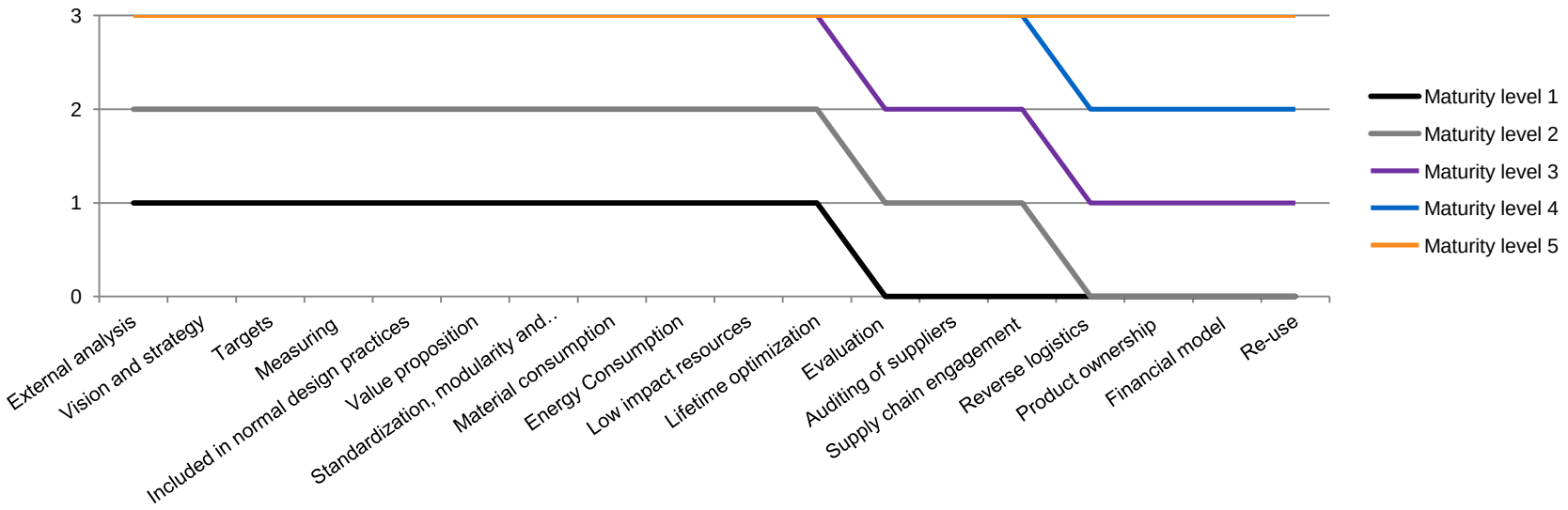
Maturity levels

	Maturity levels in Design for Environment				
Focus area	**1**	**2**	**3**	**4**	**5**
Internal (Management / R&D)	Capability 1	Capability 2	Capability 3	Capability 3	Capability 3
Supply chain / life cycle		Capability 1	Capability 2	Capability 3	Capability 3
Closing the material cycle			Capability 1	Capability 2	Capability 3



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Company assessment

Capability worksheet

Capability Worksheet

Completed by: **Date:**

Practice	Not capable 0 - Incomplete	1 - Ad-hoc	2 - Controlled	Capable 3 - Optimized	Score (0-3)	Ambition (1-3)	Comments
Perform external analysis towards the environment (labels, standards, trends, competitors, customer requirements, legislation)	None	Ad-hoc on some items	Structurally and periodically at some items, ad-hoc on the other and making the analysis easily accessible to the R&D department	Continually on all items and making the analysis easily accessible to the R&D department			
Formulate an environmental vision and strategy for innovation	None	Strategy for next generation of products	Vision and strategy and goals for long term innovation	Vision and strategy, goals, roadmap and tactical decisions for long term innovation			
Formulate project specific environmental targets	None	Ad-hoc and qualitative	Structurally and quantitative	Continually updating, quantitative and ambitious			

Objective

- Estimate current capability level
- Identify ambition towards DfE
- Awareness for DfE throughout the organization

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