Making Sustainable Happen: Sustainability Tools at Schneider Electric

Raymond Lizotte, Director, Product Stewardship Office

Toxics Use Reduction Spring Continuing Education Conference, April 4, 2019

Agenda

1	Introduction
2	A Toxics Use Reduction Story
3	Introduction to Schneider Electric
4	Sustainability at Schneider Electric
5	Sustainability Tools
6	Wrap-Up
7	Questions

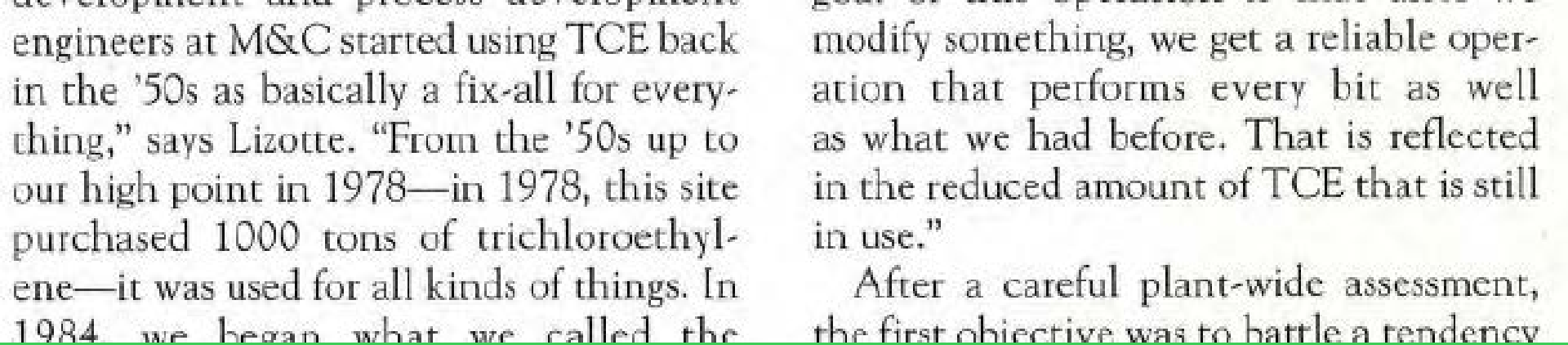
Raymond Lizotte

Director, Environmental Stewardship Office
Secure Power, Energy Management
Schneider Electric

Edison Expert (Senior Level 2)
Environment/Product Stewardship

General Application - Toxics Use Reduction Planner (expired)

Toxics Use Reduction Planner Instructor (expired)



development and process development engineers at M&C started using TCE back in the '50s as basically a fix-all for everything," says Lizotte. "From the '50s up to our high point in 1978—in 1978, this site purchased 1000 tons of trichloroethylene—it was used for all kinds of things. In 1984, we began what we called the

modify something, we get a reliable operation that performs every bit as well as what we had before. That is reflected in the reduced amount of TCE that is still in use."

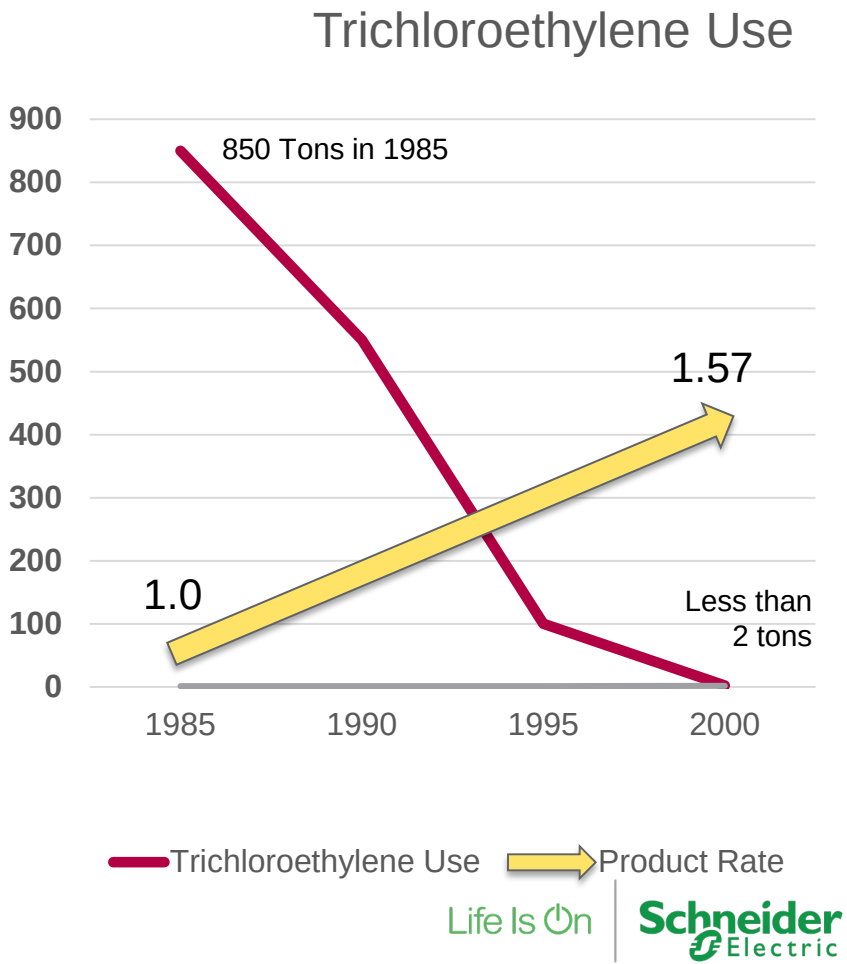
After a careful plant-wide assessment, the first objective was to battle a tendency

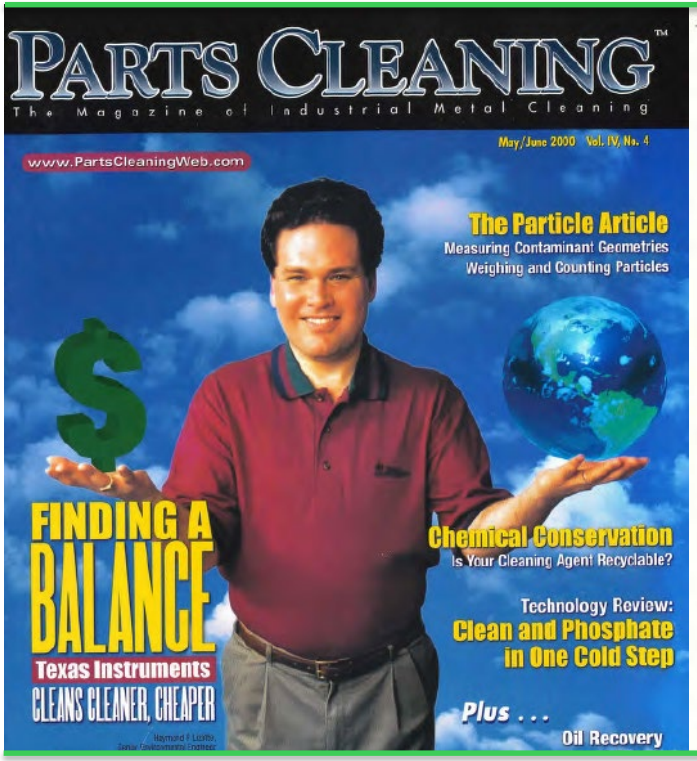
A Toxics Use Reduction Story

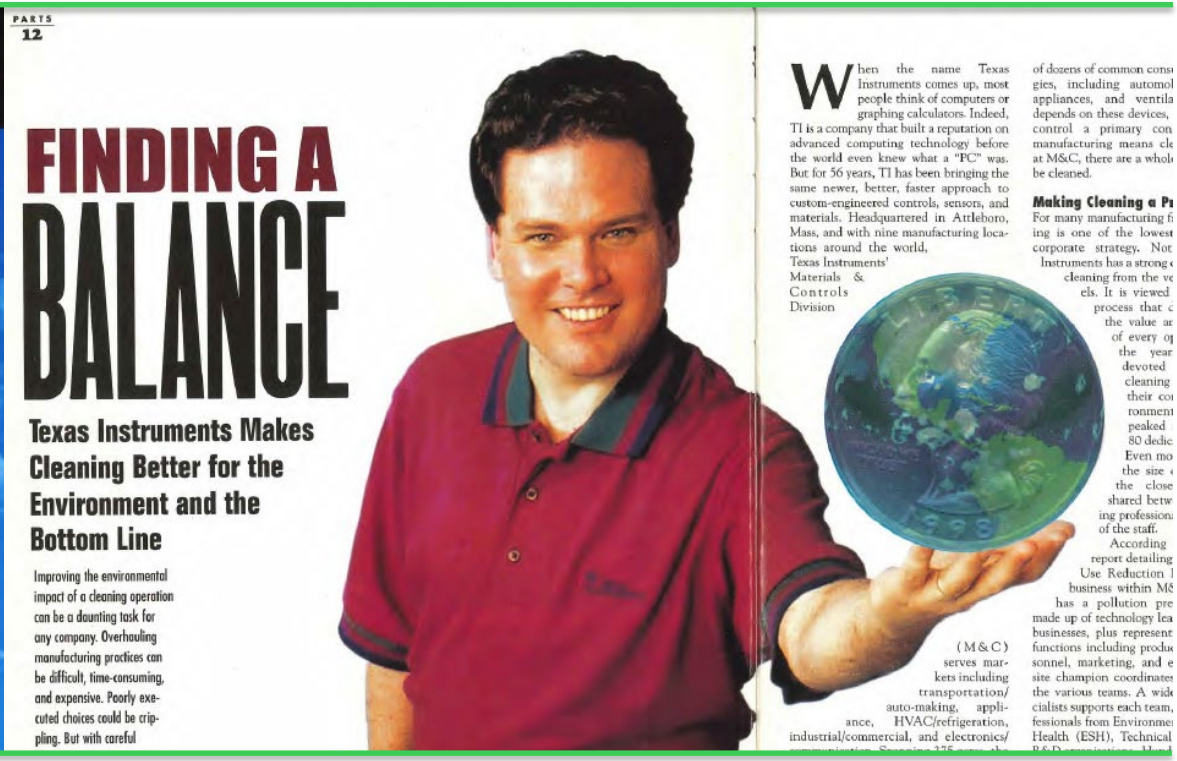

adidas

Texas Instruments Attleboro, MA

- In 1985, Texas Instruments, Attleboro used over 850 tons per year of chlorinated solvents
- Through Toxics Use Reduction Planning, the site steadily reduced solvent consumption while increasing productivity.
- By 2004, solvent use had been reduced to less than 4,000 lbs.







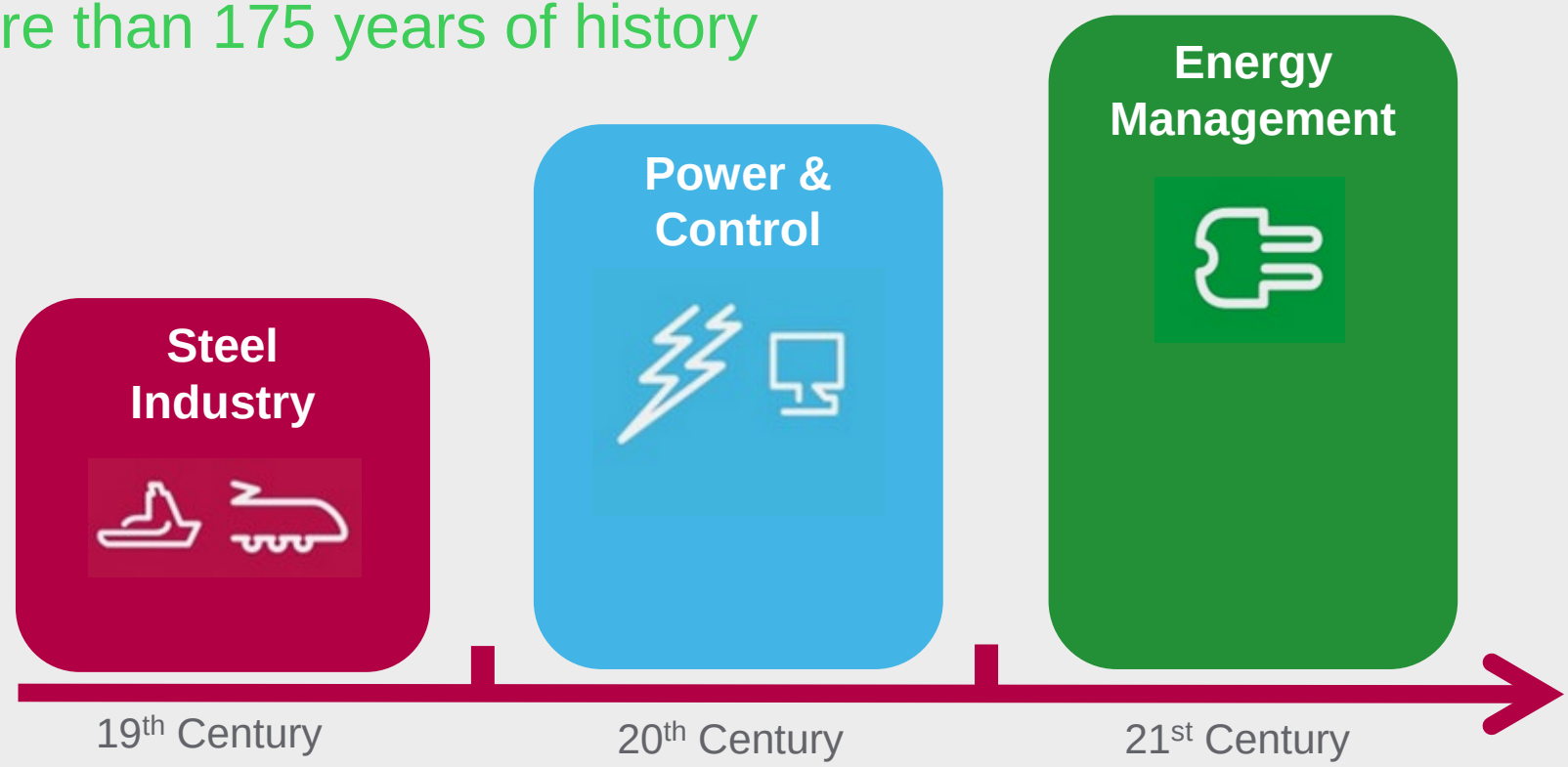
Pictured from left to right: State Representative John A. Lepper, Raymond Lizotte, State Representative Elizabeth A. Poirier and Theresa Lizotte (front).

Ray Lizotte, Senior Environmental Engineer, Texas Instruments Incorporated, Sensors and Controls Division, Attleboro

Since 1987, Ray Lizotte has fostered a team-based approach to TUR, to reduce Texas Instruments' (TI) reliance on trichloroethylene, a toxic chemical, from 850 tons a year in 1985 to less than two tons. Other victories include eliminating over two million pounds of anhydrous ammonia, and cutting its use of cyanide compounds from 35,000 pounds in 1996 to just 5,000 in 2000, for which TI received the Massachusetts Governor's Award for Excellence in TUR. Currently, as the TI Attleboro facility is transitioning from manufacturing to product development, Ray is promoting environmental sustainability through product redesign. Ray has taught several modules of the TUR Planner course since it was developed in 1992, and has contributed to nearly every major TUR educational conference for the past decade.

Introduction to Schneider Electric

Schneider Electric
More than 175 years of history



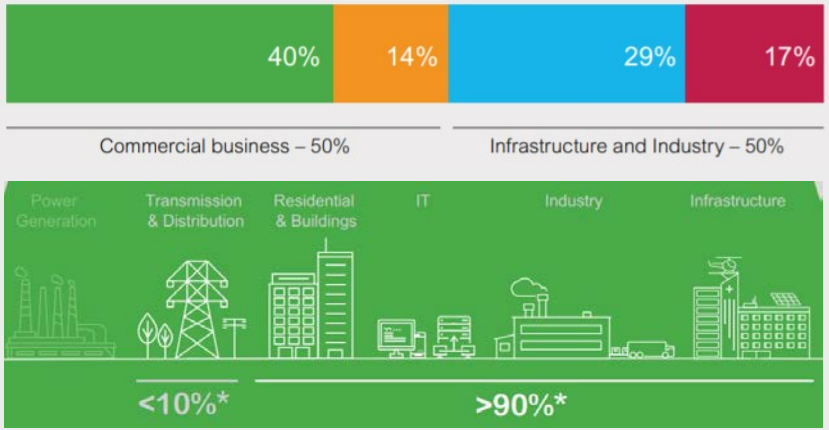
Schneider Electric, the Global Specialist in Energy Management and Automation

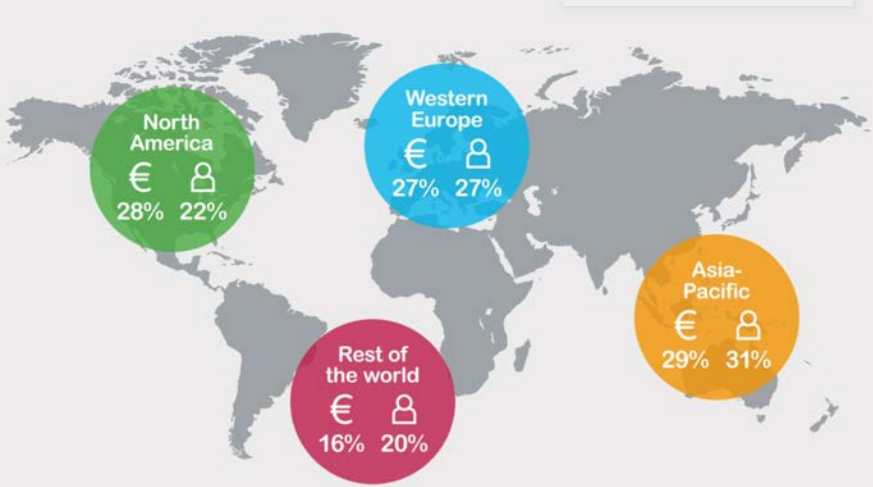
€25.7 billion
FY 2018 revenues

€ 1.3 billion
of FY revenues devoted to R&D

140,000+
people in 100+ countries

Four end markets





100-year legacy in the power distribution and energy management business

Life Is On Schneider Electric

Sustainability at Schneider Electric

Schneider Electric, Sustainable Development Goals

Schneider Electric, the global specialist in energy management and automation, undertakes to contribute to the Sustainable Development Goals (SDGs), a universal call to action launched by the United Nations to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. The Group is engaged to accomplish the 17 SDGs through its core business and its five sustainability megatrends: Climate, Circular economy, Ethics, Health & Equity, and Development.

Schneider Electric's core business

Schneider Electric has developed an integrated offer of technologies and solutions supporting the transition to a more electric, digital, decarbonized, and decentralized energy. The Group is engaged to invest EUR10 billion in innovation and R&D for sustainable development between 2015 and 2025.

http://download.schneider-electric.com/files?p_Doc_Ref=SDG_SSI

SCHNEIDER SUSTAINABILITY IMPACT

Schneider Sustainability Impact 2018 – 2020, Results as of Q4 2018

Our megatrends 2015 – 2020 and targets 2018 – 2020		Objective 12/2018	Beginning 01/2018	Results Q3/2018	Results Q4 2018	
	Overall Score of 10	5/10	3	5.25	**6.10**	↗
CLIMATE	80% renewable electricity		--	25%	**30%**	↗
	10% CO_2 efficiency in transportation		--	--	**(1.8%)**	↘
	100 million metric tons CO_2 saved on our customers' end thanks to our EcoStruxure offers		--	31	**51**	↗
	25% increase in turnover for our *Energy & Sustainability Services*		--	12.2%	**13.8%**	↗
CIRCULAR ECONOMY	75% of sales under our new *Green Premium* program		38.3%	41.4%	**45.7%**	↗
	200 sites labeled towards zero waste to landfill		140	167	**178**	↗
	100% cardboard and pallets for transport packing from recycled or certified sources		50%	60%	**61.6%**	↗
	100,000 metric tons of avoided primary resource consumption through EcoFit™, recycling and take-back programs		--	17,694	**43,572**	↗
HEALTH & EQUITY	70% scored in our *Employee Engagement Index*		65%	67%	**67%**	→
	1 medical incident per million hours worked		1.15	0.94	**0.94**	→
	90% of employees have access to a comprehensive well-being at work program		13%	UP	**20%**	↗
	100% of employees are working in countries that have fully deployed our Family Leave policy		--	--	**75%**	↗
	100% of workers received 12 hours of learning in the year with 30% digital learning		--	33%	**57%**	↗
	90% of white collars have individual development plans		32%	78%	**78%**	→
	95% of employees are working in a country with commitment and process in place to achieve gender pay equity		89%	89%	**92%**	↗
ETHICS	5 pts /100 increase in average score of ISO26000 assessment for our strategic suppliers		--	+1.47	**+1.80**	↗
	300 suppliers under Human Rights & Environment vigilance received specific on-site assessment		--	104	**155**	↗
	100% of sales, procurement, and finance employees trained every year on anti-corruption		--	47.4%	**68.6%**	↗
DEVELOPMENT	x4 turnover of our Access to Energy program		--	x1.33	**x1.31**	↘
	350,000 underprivileged people trained in energy management		148,145	190,836	**196,162**	↗
	12,000 volunteering days thanks to our VolunteerIn global platform		--	3,657	**5,691**	↗

↗↗ *The arrow shows if the indicator has risen, stayed the same or fallen compared to the previous quarter. The color shows if the indicator is above or below the objective of 5/10. UP = Unpublished.*

Schneider Electric, Sustainable Development Goals

80% renewable electricity

10% CO2 efficiency in transportation

100 million metric tons of CO2 avoided on our customers' end through our offers

25% increase in turnover for our EcoStruxure Energy & Sustainability Services

Schneider Electric, Sustainable Development Goals

75% of sales under our new Green Premium™ program

200 sites labeled toward zero waste to landfill

100% cardboard and pallets for transport packing from recycled or certified sources

100,000 metric tons of avoided primary resource consumption through ecoFit™, recycling, and take-back programs

Schneider Electric, Green Premium ecolabel

Schneider Electric products, services, and solutions earn the Green Premium ecolabel by meeting a number of pre-defined conditions

Green Premium™ Sustainable performance, by design

•Compliance & transparency

•Reliable information on regulated substances present in products, their environmental impact and circular instructions.

•Business value (Well-being performance, Resource performance, Circular performance)

•Tailored value propositions which provide differentiation for our products, solutions, and services.

•Differentiating with claims and external labels

•Validation by leading third party labels increases the credibility of our products' environmental profile to our customers.

•

Schneider Electric, Tools

Product Development Teams with the Tools to Deliver Product Offers to Craft Sustainable Development Goals

- Life Cycle Assessment
- Material Footprint
- Eco-Design

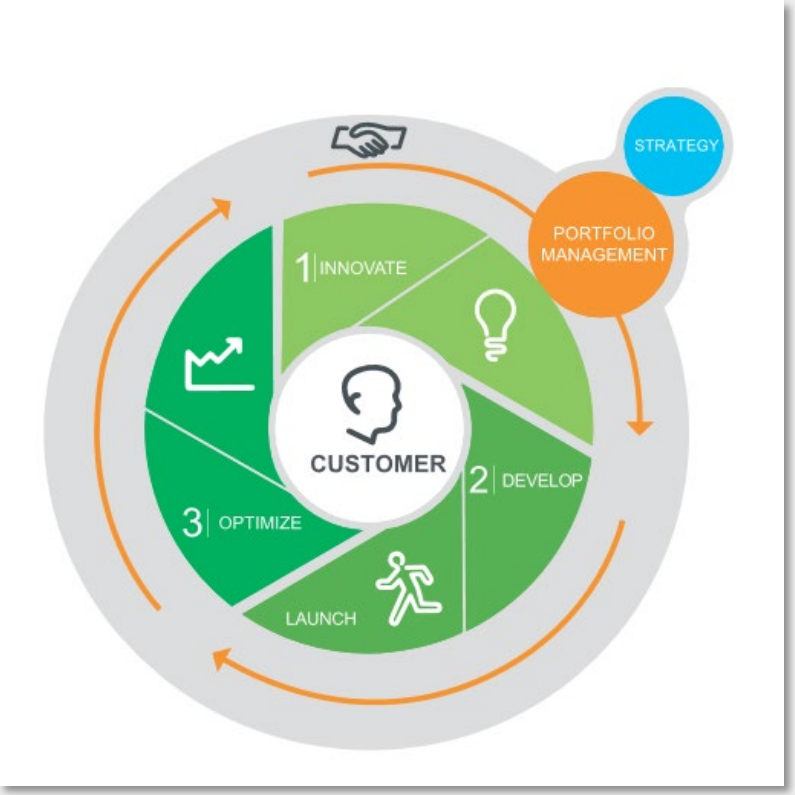
Sustainability Tools – Crafting Sustainable Offers

Sustainability Tools

Offer Creation Process (OCP)

Three Major Parts

- INNOVATE
  - Formalization of the innovation process
- DEVELOP/LAUNCH
  - Flawless delivery of Offers
- OPTIMIZE
  - Continuous improvement of Offers



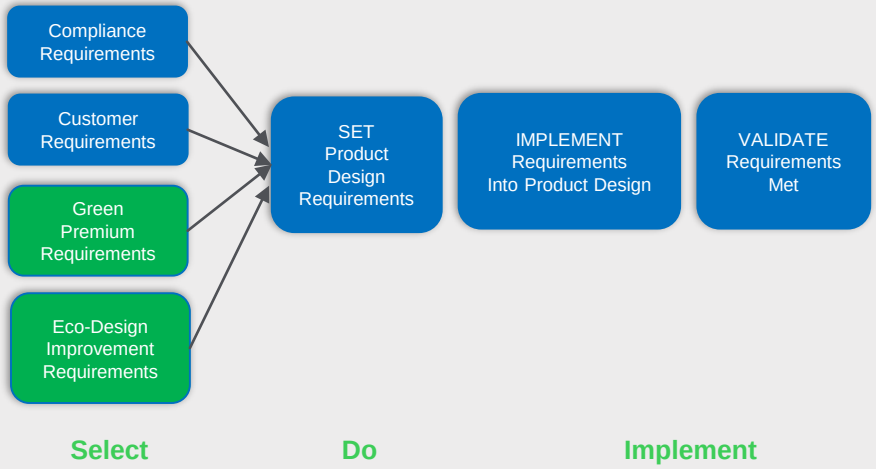
Sustainability Tools

OCP Product Management Process (PMP)

7 Stage Gates and 6 phases:

- OPEN (Concept and feasibility)
- SELECT (Definition)
- DO (Product & process design)
- IMPLEMENT (Implementation & validation)
- PRODUCE (Production for stock)
- SELL (Launch & closure)
- CLOSE

Sustainability Product Design Requirements:

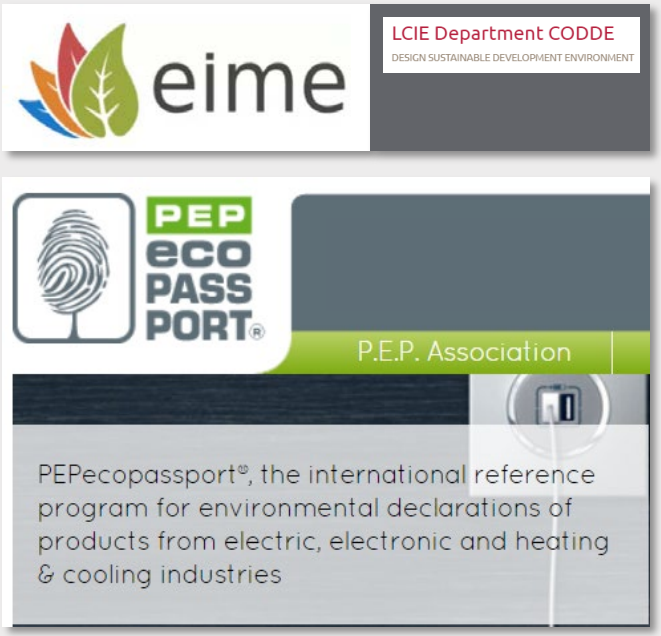


Sustainability Tools

Life cycle Assessment (LCA) is imbedded into Green Premium Requirements

- Schneider Electric requires all New Offers to achieve Green Premium status
- Green Premium: Product Environmental Profile (PEP or EPD)
- PEPs include LCA
- Products responsible for 75% of annual revenues are Green Premium with LCAs
- Over 2,000 PEPs with LCAs in catalog

Sustainability Tools



LCA Methodology

- Single LCA Tool: EIME LCA Software
- Common Rules: PEP EcoPassport defines Product Characterization Rules (PCRs) and Product Specific Rules (PSRs)
- Reviewed and certified by third party (Type III environmental Declaration)
- Shared data sources and support tools
- Company-wide Expert Network

Sustainability Tools

LCA Creation Process

- Define Product Range
- Link to PCR/PSRs
- Collect Data
- Run LCA Tool
- Submit for review and verification
- Publish

Data Requirements

- Product Composition
  (Components, Materials)
- Sourcing
  (Supplier location)
- Manufacturing Operations
- Distribution
- Installation
- Use
  (Energy, Maintenance)
- End of Life Outcome

Sustainability Tools

LCA Output: Environmental Impacts of the Product Range

Environmental Impact indicators	Unit	P8VNTG Green Personal Surge Protectors					
		S = M + D + I + U + E	Manufacture	Distribute	Install	Use	End of Life
Raw Material Depletion	Y-1	1.80E-12	1.80E-12	1.99E-18	0	1.92E-15	3.93E-18
Energy Depletion	MJ	4.90E+03	3.20E+03	1.46E+00	0	1.69E+03	2.88E+00
Water depletion	dm^3	1.03E+03	7.82E+02	1.39E-01	0	2.45E+02	2.74E-01
Global Warming	g≈CO_2	2.26E+05	1.41E+05	1.16E+02	0	8.55E+04	2.28E+02
Ozone Depletion	g≈CFC-11	2.22E-02	1.73E-02	8.18E-05	0	4.64E-03	1.61E-04
Air Toxicity	m^3	4.83E+07	3.40E+07	2.18E+04	0	1.42E+07	4.30E+04
Photochemical Ozone Creation	g≈C_2H_4	9.93E+01	7.01E+01	9.89E-02	0	2.89E+01	1.95E-01
Air acidification	g≈H^+	3.89E+01	2.73E+01	1.47E-02	0	1.15E+01	2.91E-02
Water Toxicity	dm^3	4.51E+04	2.06E+04	1.45E+01	0	2.44E+04	2.85E+01
Water Eutrophication	g≈PO_4	9.86E+00	9.65E+00	1.92E-03	0	2.01E-01	3.79E-03
Hazardous waste production	kg	3.30E+00	1.88E+00	4.30E-05	0	1.42E+00	8.49E-05

Sustainability Tools

LCA Output: Identify the key Phase and Impacts

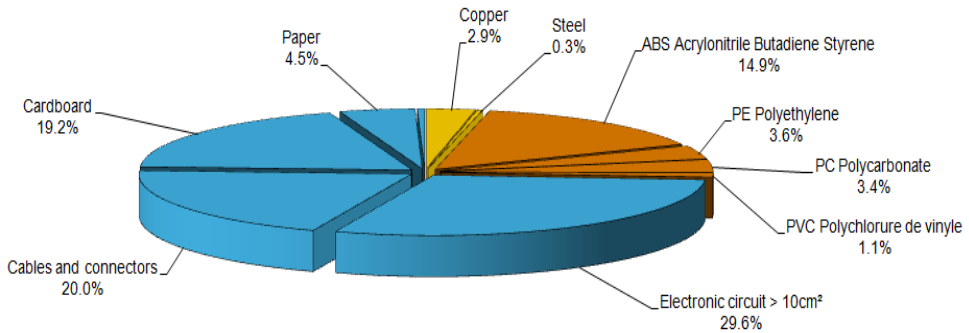
Environmental Impact indicators	Unit	P8VNTG Green Personal Surge Protectors					
		Ranking Weight	Manufacture	Distribute	Install	Use	End of Life
Raw Material Depletion	Y-1	5	99.9%	0.0%	0.0%	0.1%	0.0%
Energy Depletion	MJ	4	65.3%	0.0%	0.0%	34.5%	0.1%
Water depletion	dm^3	3	75.9%	0.0%	0.0%	23.8%	0.0%
Global Warming	g≈CO_2	5	62.4%	0.1%	0.0%	37.8%	0.1%
Ozone Depletion	g≈CFC-11	3	77.9%	0.4%	0.0%	20.9%	0.7%
Air Toxicity	m^3	3	70.4%	0.0%	0.0%	29.4%	0.1%
Photochemical Ozone Creation	g≈C_2H_4	3	70.6%	0.1%	0.0%	29.1%	0.2%
Air acidification	g≈H^+	2	70.2%	0.0%	0.0%	29.6%	0.1%
Water Toxicity	dm^3	4	45.7%	0.0%	0.0%	54.1%	0.1%
Water Eutrophication	g≈PO_4	2	97.9%	0.0%	0.0%	2.0%	0.0%
Hazardous waste production	kg	5	57.0%	0.0%	0.0%	43.0%	0.0%

Sustainability Tools

Material Footprint

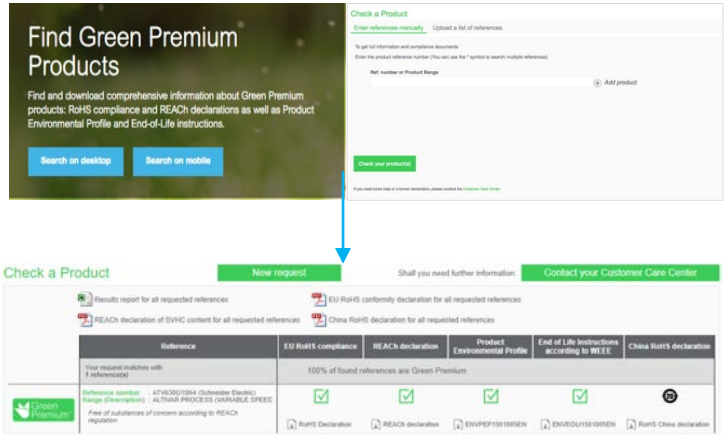
- Based on the Material Declarations of components, materials
- Material Account
- Identify Materials linked to Environmental Impact indicators
- Identify Materials subject to Regulations

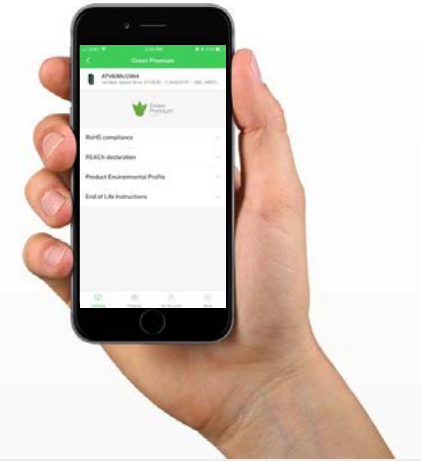
P8VNTG Green Personal Surge Protectors

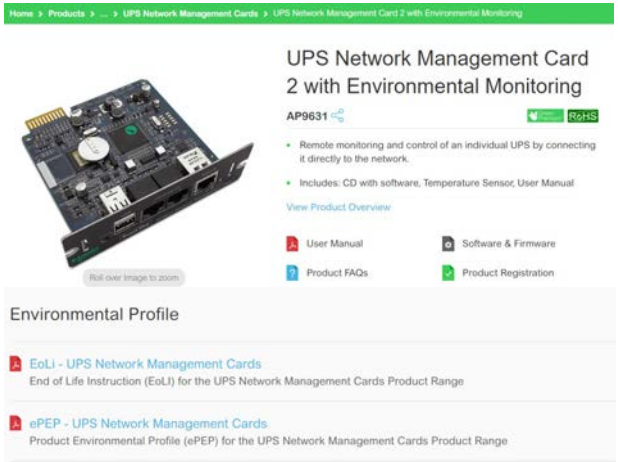


PEPs with LCAs are published externally

Check-a-Product + mySchneider App + On-line Catalog







Life Is On Schneider Electric

Sustainability Tools

Eco-Design (EcoDesign Way)

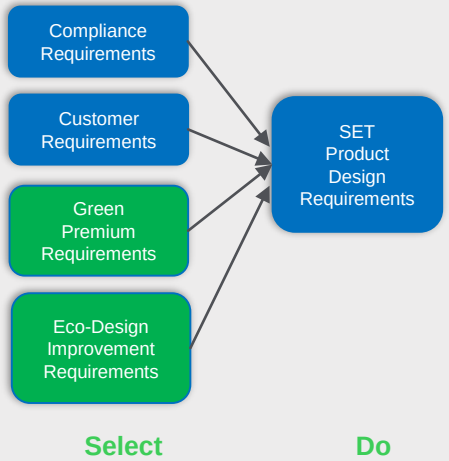
- Process for identifying opportunities to improve Offer sustainability profile

- Two level process:

1. Product Conception during INNOVATE
2. Setting Product Requirements during DEVELOP/SELECT-DO

1.

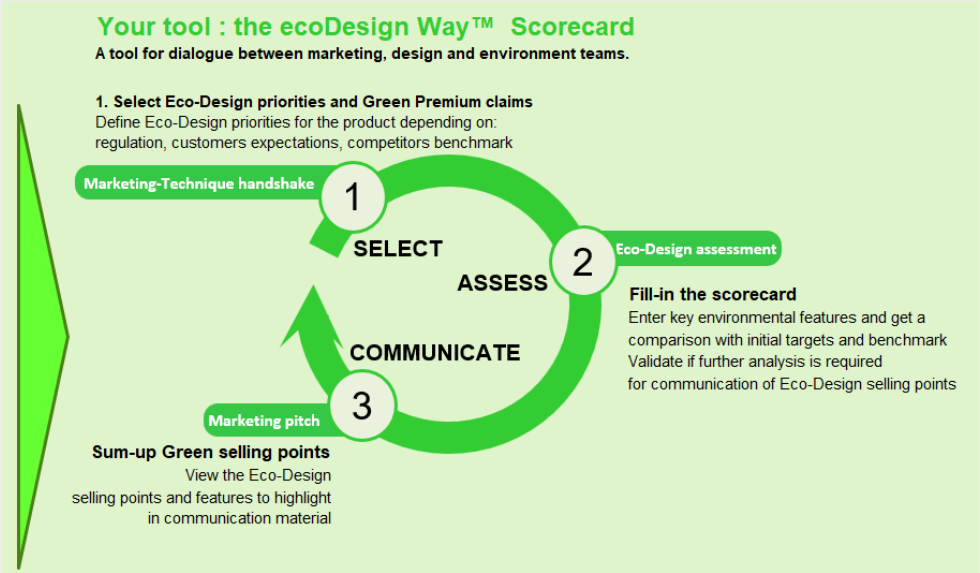
2.



Sustainability Tools

The ecoDesign Way Scorecard Tool guides eco-design efforts

- Define eco-design priorities (key impacts, phases, materials, regulations, customer care-abouts, competitor benchmarks)
- Identify Opportunities
- Calculate improvements in key impacts (via abridged LCAs)
- Validate from product design
- Communicate improvements to marketing



Sustainability Tools

Eco-Design in INNOVATE

- Define functional requirements that transform the sustainability & environmental performance (Brainstorm, goal is to INNOVATE)
- Brainstorm Wish List, assume no restrictions
- Assess possibilities – Now, Near-term, Long-range
- Business Analysis – What makes sense for the buisness
- Select improvements to add to offer design

Sustainability Tools

Example: Advanced Battery UPS

Key Impacts of traditional UPS using Lead-Acid Battery Technology in USE Phase, Energy Impacts and MANUFACTURING Phase, Material Impacts.

Focus Area - Manufacturing

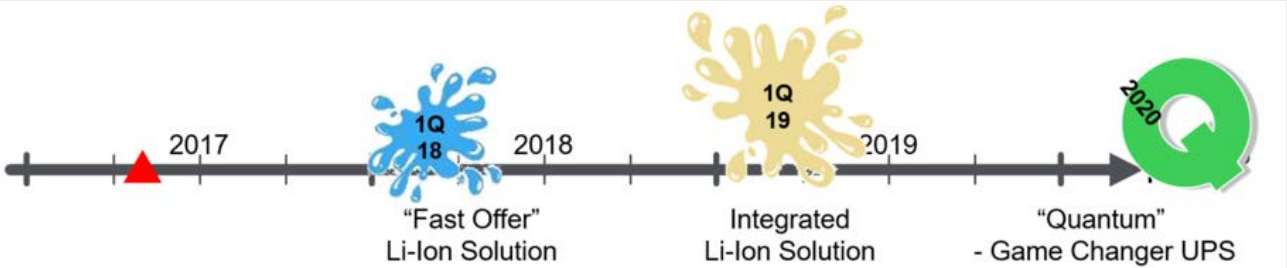
Focus Area - USE

UPS LCA -		S = M + D + I + U + E	M	D	I	U	E
Energy Depletion (ED)	MJ	3.87E+03	9.72E+02	8.02E+00	0.00E+00	2.88E+03	**7.05E+00**
Global Warming Potential (GWP)	g CO_2 eq.	1.96E+05	5.27E+04	5.68E+02	0.00E+00	1.42E+05	**5.01E+02**
Hazardous Waste Production (HWP)	kg	6.53E-01	6.28E-01	7.04E-07	0.00E+00	2.44E-02	**6.20E-07**
Raw Material Depletion (RMD)	Y-1	**3.16E-13**	**3.14E-13**	**1.16E-17**	**0.00E+00**	**1.92E-15**	**1.02E-17**

Sustainability Tools

Example: Advanced Battery UPS

INNOVATE Eco-Design Assessment defined FAST OFFER to be implemented first, followed by an INTEGRATED OFFER with more Sustainability features and then followed by QUANTUM OFFER with “Game Changing” Sustainability features



	“Fast Offer” Li-Ion Solution	Integrated Li-Ion Solution	“Quantum” - Game Changer UPS
Size & Weight	*Good*	**Better**	*Best – Using world-leading electronics / power trains*
Efficiency	*No change*	**No change**	
Battery Certainty	*Good*	**Better**	*Best - World-leading*
Cost of Ownership	*Good*	**Better**	*Best - World-leading*

Sustainability Tools

Schneider Electric **EcoDesign scorecard**

Home

1. Select scorecard configuration
2. Fill-in the scorecard
2' Validate: further analysis required?
3. **Sum up ecoDesign selling points**
ecoDesign progress follow up

The product is an ecosolution: it contributes to significant energy savings for the customer.

Key performance features to outline:

100	Very Good performance on climate change
73	Good performance on materials
80	Good performance on health
33	Average performance on efficiency
75	Good performance on serviceability
73	Good performance on circularity
121	Very Good performance on packaging

1. List of other environmental selling points:
1 RoHS, REACH Compliant
2 Energy Efficient
3 Green Premium

The product is an ecosolution: it contributes to significant energy savings for the customer.

Key performance features to outline:

100	Very Good performance on climate change
83	Good performance on materials
80	Good performance on health
33	Average performance on efficiency
75	Good performance on serviceability
93	Good performance on circularity
121	Very Good performance on packaging

2. List of other environmental selling points:
1 RoHS, REACH Compliant
2 Energy Efficient
3 Green Premium
4 Longer Life Lithium Ion Battery Pack
5 Lighter Weight
6. Optimized Packaging

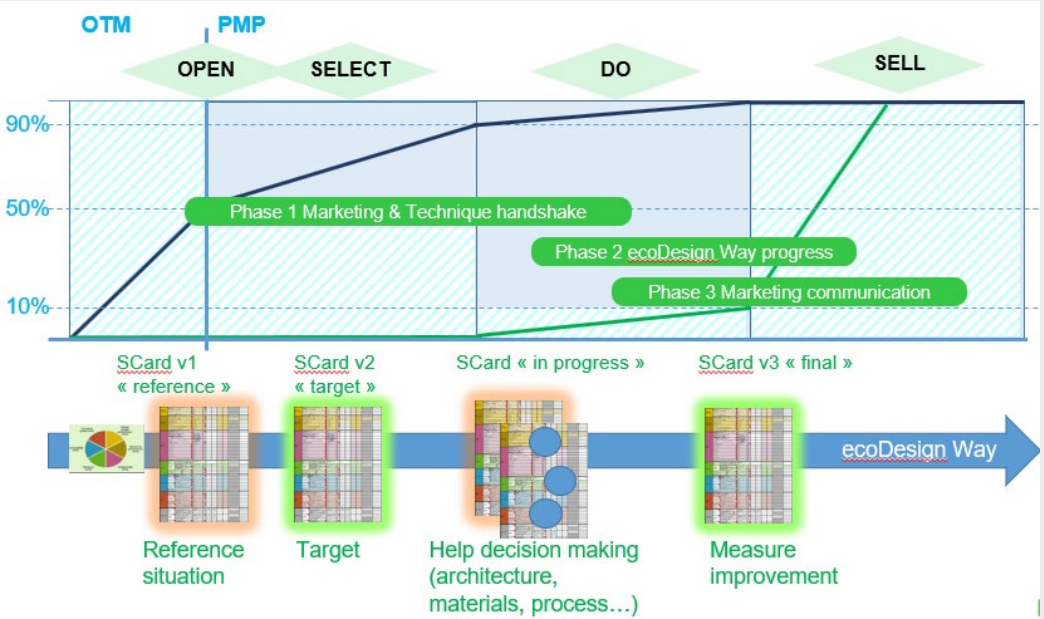
1.

Weight: 24.6 kg
RBC Weight: 11.68 kg
3-5 Year Battery

2.

Weight: 17.50 kg
RBC Weight: 1.9 kg
7-10 Year Battery

Sustainability Tools

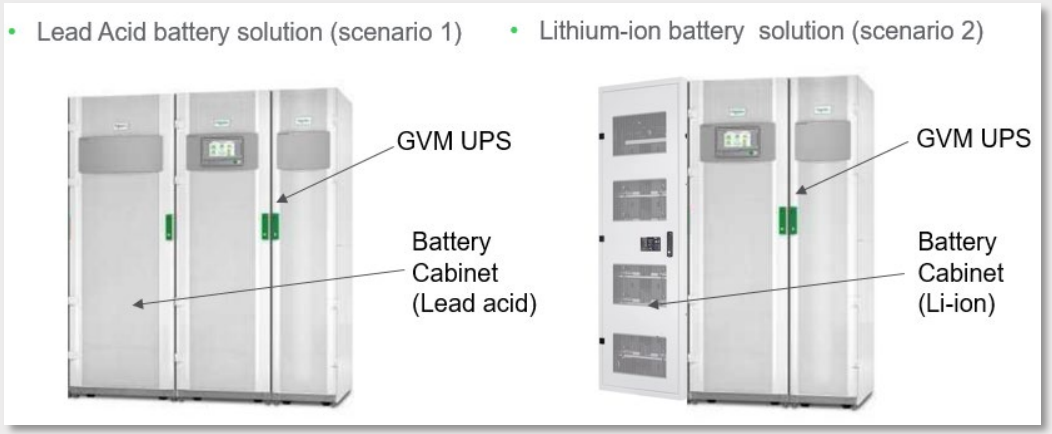


Eco-Design in DEVELOP

Identify Improvement Opportunities

- Focus on optimizing design criteria identified during INNOVATE Eco-Design Assessment.
- Address sustainability areas (Packaging, Green Premium, other certifications) that are managed primarily during product design.
- ecoDesign Way Tool

Sustainability Tools



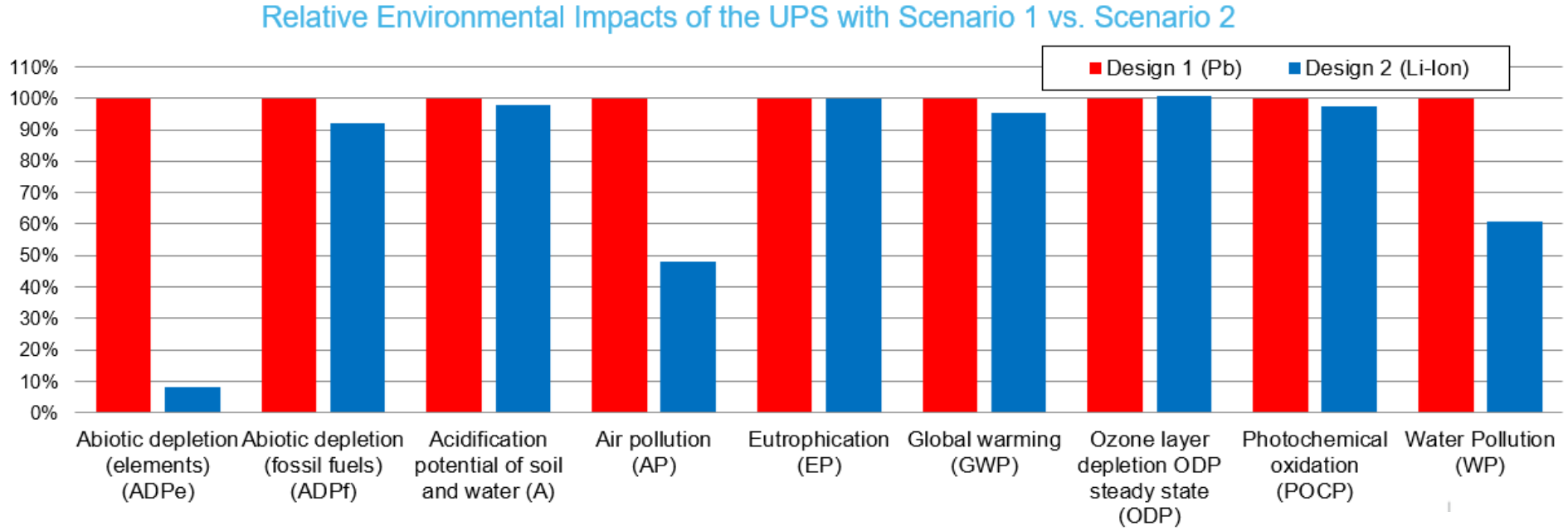
Eco-Design in DEVELOP

- Define baseline for product range
- Identify key LC Phases, Impacts
- Identify Materials causing Impacts
- Identify Improvement Options
- Run limited LCA with improvements
- Calculate improvements to Impacts
- Select improvements to add to Design Requirements

Sustainability Tools

Impact indicator	Unit	Design 1 Sum Lead Acid Batteries	Design 2 Sum Li-Ion Batteries	Variance	Variance (%)	Rank
Abiotic depletion (elements) (ADPe)	kg antimony eq.	2.6E+01	2.0E+00	-2.4E+01	-92.0%	
Abiotic depletion (fossil fuels) (ADPf)	MJ	3.2E+06	3.0E+06	-2.6E+05	-8.0%	
Acidification potential of soil and water (A)	kg SO2 eq.	2.2E+03	2.1E+03	-4.4E+01	-2.0%	
Air pollution (AP)	m^3	2.9E+07	1.4E+07	-1.5E+07	-52.2%	
Eutrophication (EP)	kg PO4--- eq.	9.9E+01	9.9E+01	-1.5E-02	0.0%	
Global warming (GWP)	kg CO2 eq.	3.0E+05	2.9E+05	-1.4E+04	-4.6%	
Ozone layer depletion ODP steady state (ODP)	kg CFC-11 eq.	7.2E-02	7.3E-02	5.4E-04	0.7%	
Photochemical oxidation (POCP)	kg ethylene eq.	1.0E+02	1.0E+02	-2.8E+00	-2.7%	
Water Pollution (WP)	m^3	2.1E+07	1.3E+07	-8.4E+06	-39.3%	

Sustainability Tools



Sustainability Tools

ecoDesign Way Environmental Impacts Assessment

- Abiotic depletion of elements had the most significant change, which occurs in the MANUFACTURING and USE phases. The changes are due to the following:
  - Reduction of the battery mass from approximately 1,350 kg of Pb batteries to 132 kg of Li-Ion batteries
  - Elimination of replacement batteries in the use phase and respective packaging, and associated end of life

- Global Warming Potential had a modest reduction of approximately 5% with the Li-ion battery system.

Wrap Up

Wrap Up

Schneider Electric Sustainability

Product Range	Life Cycle Assessment	Environmental Impact Indices	EcoDesign Way (planning process)	Material Footprint

Wrap Up

Schneider Electric Sustainability

Product Range	Life Cycle Assessment	Environmental Impact Indices	EcoDesign Way (planning process)	Material Footprint

Toxics Use Reduction Planning

Product (unit of product)	Production Unit (PFD)	Byproduct Reduction Indices	TUR Plan (planning process)	Regulated list

While you can take the boy out of Massachusetts…..

While you can take the boy out of Massachusetts…..

….You can’t take TOXICS USE REDUCTION out of the boy!

Life Is On | Schneider Electric