

Evaluation of the Proposed Sustainability Metrics for Metal Finishing - AESF Research Project R-121

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Dear Colleagues: Funded by AESF Foundation, Wayne State University is developing a sustainability metrics system and a sustainable solution methodology for helping improve sustainability performance in metal finishing facilities. The purpose of this survey is to seek industry's help in evaluating a draft version of sustainability metrics system in terms of the appropriateness and importance of each indicator in different sustainability categories, and providing your comments and suggestions. Your feedback is highly valuable and we deeply appreciate your support. Yinlun Huang (Project PI), March 31, 2021

Date					
Organization (optional)		Address (optional)			
Contact Person (optional)		Email or Phone No. (Optional)			
Business Type	Electroplating _____	Other Type of Metal Finishing _____	Chemical Supply _____	OEM _____	Technology _____ Consulting _____
	Customer _____	Community or Other Stakeholder _____	Government _____	State/Local Agency _____	Professional Organization _____ Other _____
Job Responsibility/ Expertise (check all if appropriate)	Management _____		Health and Safety _____		Technology / Research _____
	Process Engineering / Production _____		Supply / Sales _____		Education _____
	Environmental _____		Customer Relation _____		Other _____

Instruction:

- In the "Rating of Importance" column, please enter a numerical number in each cell.
- In the "Comments or Suggestions" column, you may provide your comments and/or suggestions on any listed indicators. You may also add new or modified indicators and share your thoughts about feasibility of data collection in your company.

Sustainability Category	Subcategory	Indicator	Definition or Explanation	Rating of Importance (enter a number between 1 and 10, with 1 = least important and 10 = most important)	Comments or suggestions
	E-1: Profit, Value and Tax	E-1-1: Value Added (\$/yr)	Based on the difference between the product price to consumers and the manufacturing cost		
		E-1-2: Value Added per Direct Employee (\$/yr)	Average amount each employee adds in value to the company		
		E-1-3: Net Profit Margin (%/\$)	Based on the difference between the income from produce sale after tax and the production cost		
		E-1-4: Net Profit per Direct Employee (\$/yr)	Average amount of profit each employee makes for the company		
		E-1-5: Tax Paid as a Percentage of NIBT (%)	Amount of tax paid as a percentage of Net Income Before Tax (NIBT)		
		E-1-6: Return on Average Capital Employed (\$/yr)	Amount of money received back with respect to the average capital employed		
	E-2: Investments	E-2-1: Percentage increase in capital Employed (%/yr)	Increase of average capital employed from last year		
		E-2-2: Percentage of New Employees (%/yr)	Percentage of new employees hired in the company per year		
		E-2-3: Percentage of Training vs Payroll Expense (%)	Amount of money spent on training of employees as a percentage of payroll expense		
		E-2-4: Investment for Employee's Education/Training (\$)	Amount spent on employee education and training regarding important aspects of their jobs		
		E-2-5: Investment on New Technology (%/yr)	Percent increase spent on new technology from last year		

E: Economic Sustainability	E-3: Technology Advancement	E-3-1: Production Increment Percentage per Dollar Investment on New Technology (%/\$-new tech)	Amount of production increase from last year vs the amount of money invested on new technologies since last year		
		E-3-2: Production Increment Percentage per Dollar Investment on Technology Improvement (%/\$-existing tech)	Amount of production increase from last year vs the amount of money invested on existing technology improvement since last year. Existing technology improvement does not include investment on new technologies		
		E-3-3: Production Quality Improvement Percentage per Dollar Investment on New Technology (%/\$-new tech)	Quality of production improvement from last year vs the amount of money invested on new technologies since last year		
		E-3-4: Production Quality Improvement Percentage per Dollar Investment on Technology Improvement (%/\$-existing tech)	Quality of production improvement from last year vs the amount of money invested on existing technology improvement since last year. Existing technology improvement does not include investment on new technologies		
		E-3-5: Waste Reduction Percentage per Dollar Investment on new Technology (%/\$-new tech)	Amount of waste reduced from last year vs the amount spent on new technologies since last year		
		E-3-6: Waste Reduction Percentage per Dollar Investment on Technology Improved (%/\$-existing tech)	Amount of waste reduced from last year vs the amount spent on existing technology improvement since last year. Existing technology improvement does not include investment on new technologies		
	E-4: Production and Product Quality	E-4-1: Percentage of Product Delivered on Time (%)	Percent of product that was delivered on time based on total products delivered per year		
		E-4-2: Product Defect Rate During Production (%)	Amount of defected product vs the total amount of product made per year		
		E-4-3: Product Return Rate After Shipment (%)	Amount of product returned after shipment vs the amount of product shipped per year		
	V-1: Materials (Excluding Fuel and Water)	V-1-1: Chemical Use in Production per Value Added (lb/\$)	Amount of chemical used in production per dollar of value added per year		
		V-1-2: Chemical Use in Production per Dollar of Product Sales (lb/\$)	Amount of chemical used in production per dollar of product sales per year		
		V-1-3: Chemical Use in Waste Treatment per Value Added (lb/\$)	Amount of chemical used in waste treatment per dollar of value added per year		
		V-1-4: Plating Solution Use per Value Added (lb/\$)	Amount of plating solution use per dollar of value added per year		
V-1-5: Plating Solution Use per Dollar of Product Sales (lb/\$)		Amount of plating solution use per dollar of product sales per year			
V-1-6: Other Material Use per Dollar of Product Sales (lb/\$)		Amount of other material use per dollar of product sales per year			

V: Environmental Sustainability	V-2: Water	V-2-1: Fresh Water Use in Production per Dollar of Product Sales (lb/\$)	Amount of fresh water use in production per dollar of product sales per year			
		V-2-2: Used Water Reused in Production before Treatment (%)	Percentage of used water reused in production per year before treatment of waste			
		V-2-3: Fraction of Water Recycled Within Plant (%)	Percentage of water recycled within the plant			
	V-3: Energy	V-3-1: Electricity Use per Dollar of Sales (KW/\$)	Kilo Watts of electricity use per dollar of product sales per year			
		V-3-2: Natural Gas and Oil Use per Dollar of Sales (MMBtu/\$)	Million Btu of natural gas and oil use per dollar of product sales per year			
		V-3-3: Clean Energy Use Among All Energy (%)	Percentage of energy derived from "clean" sources vs all energy consumed			
		V-3-4: Non-Production Energy Among All Energy Consumption (%)	Percentage of energy not used in production vs all energy consumed			
	V-4: Waste Generation and Effluents	V-4-1: Spent Solutions per Value Added (lb/\$)	Amount of spent solution per dollar value added per year			
		V-4-2: Wastewater Generated in Production per Value Added (lb/\$)	Amount of wastewater generated in production per dollar of value added per year			
		V-4-3: Wastewater Treatment Sludge per Value Added (lb/\$)	Amount of wastewater treatment sludge used per dollar of value added per year			
		V-4-4: Hazardous Waste Generated per Value Added (lb/\$)	Amount of hazardous waste generated per dollar of value added per year			
		V-4-5: Non-Hazardous Waste Generated per Value Added (lb/\$)	Amount of non-hazardous waste generated per dollar of value added per year			
	L: Social Sustainability	L-1: Workplace	L-1-1: Benefits as Percentage of Payroll Expense (%)	Benefits to employees as a percentage of total payroll expenses per year		
			L-1-2: Work Related Re-Education and/or Training (%)	Amount of money spent on work related reeducation and training vs total payroll expenses per year		
			L-1-3: Employee Turnover (%)	Resigned and redundant employees vs total employed per year		
L-1-4: Promotion Rate (%)			Number of Promotions vs total employed per year			
L-1-5: Working Hours Lost as Percentage of Total Hours Worked (%)			Working hours lost vs total hours worked per year			
L-2: Safety and Health		L-2-1: Number of Process Safety Reviews (/yr)	Number of process safety reviews per year			
		L-2-2: Number of Accidents in Workplace (/yr)	Number of accidents in the workplace per year			
		L-2-3: Chemical Leakage in Plant (/yr)	Amount of chemical leakage in plant per year			
		L-2-4: Human Health Burden (Carcinogenic) per Value Added (/S)	Number of people in the workforce and local community with carcinogenic health conditions as a result of the plant per dollar of value added per year			
L-3: Society		L-3-1: Number of Stakeholder Meetings (/yr)	Number of stakeholder meetings per year			
		L-3-2: Indirect Community Benefit (\$/yr)	Amount of money spent with indirect community benefit per year			
		L-3-3: Number of Complaints from Local Community (/yr)	Number of complaints from the local community per year			
		L-3-4: Number of Complaints from Customers (/yr)	Number of complaints from customers per year			
		L-3-5: Number of Legal Actions per Value Added (/yr)	Number of legal actions per dollar of value added per year			

Additional Comments and Suggestions: