SUSTAINABLE INDUSTRIES
PERFORMANCE INDICATOR FRAMEWORK
FINAL REPORT

Prepared By: Tracy Casavant, MES, P.Eng.
Wendy LeBreton, MES

Prepared For: Industry Canada Sustainable Technologies and Industry Branch (Ottawa)
March 23, 2005

Eco-Industrial Solutions Ltd.
Vancouver Tel: 604.737.8506 Regina Tel: 306.789.9799 Fax: 604.648.8439 E-Mail: info@ecoindustrial.ca

ACKNOWLEDGEMENTS

We would like to acknowledge the support of Industry Canada's Sustainable Technologies and Industries Services Branch, in particular, Mr. Patrick Pinsonneault. We would also like to acknowledge the staff of Holland Barrs Planning Group, with whom we engaged in some very beneficial discussions regarding land use-related indicators.

TABLE OF CONTENTS

LIST OF TABLES

1 INTRODUCTION

Indicators are bits of information that highlight what is happening in a larger system. They are small windows that together provide a glimpse of the "bigger picture".

Sustainable Seattle – Indicators of Sustainable Community

1.1 PROJECT OVERVIEW

Sound decision-making depends on our ability to measure our performance, allowing us to learn and adapt from our successes (and failures). Performance indicators help us to measure our performance in a systematic, consistent, and rigorous way. Performance indicators are designed to tell us:

- How well are we doing overall (measure versus baseline)?
- How well are we doing compare to last year (measure versus target)?
- How well are we doing compared to everyone else (measure versus benchmark)?
- How well will we do next year if we continue "business as usual" (projection)?
- How well would we like to do next year (target)?

The National Roundtable on the Environment and Economy (NRTEE) notes that by standardizing a core set of performance indicators, performance can not only be measured for individual businesses, but comparisons can also be made between businesses and sectors[1].

Financial performance indicators are used by virtually every business and government, e.g., Gross Domestic Product or GDP, to track their performance, to set targets and to increase shareholder confidence. With a growing awareness of sustainability, businesses have also developed performance indicators to track broader economic, as well as environmental and social, progress. More environmentally progressive businesses such as those on the Dow Jones Sustainability Index now include environmental and social indicators within their corporate annual reports. The World Business Council for Sustainable Development and NRTEE have also developed eco-efficiency indicators, designed to help businesses measure their economic and ecological performance from a more life-cycle perspective.

Communities have also expanded their use of performance indicators to encompass sustainability measures, such as pedestrian-friendliness or acres of greenspace. Many communities now publish State of the Environment or Sustainability reports which contain many performance indicators meant to demonstrate the community's current economic, ecological, and social health.

The performance indicator framework outlined in this report brings together and adapts business and community sustainability indicators so that they can be applied to geographically bounded areas with intense light, medium, and/or heavy industrial activity, such as industrial or business parks. Neither the eco-efficiency nor sustainable communities sets of indicators could be used to provide a complete picture of the sustainability performance of industrial areas. Some of the indicators have never been applied to industrial practice, or they have not been applied to measure aggregate performance to help provide a "big picture" assessment of sustainability.

[1] NRTEE. 2001. Eco-Efficiency Indicators Workbook

The performance indicator framework will also allow us to understand and articulate key sustainability issues faced by industry and to showcase sustainable industrial practices[2], especially those associated with multi-stakeholder, industry-focused sustainability initiatives, such as eco-industrial networking (EIN). A set of standardized, rigorous measures will facilitate the tracking of costs and benefits of innovative solutions. The lack of measured (or measurable) results has been a barrier to successful implementation of EIN (and the creation of eco-industrial parks) across Canada. While anecdotal evidence and descriptions of the benefits of EIN are motivational, quantitative, demonstrable benefits are more effective for engaging the business community and for securing financing to implement EIN. A consistent performance indicator framework will also lead to more adaptive management and "learning by doing", which will in turn lead to further innovation.

1.2 PROJECT SCOPE

In developing this framework, it became apparent that there are an almost infinite number of performance indicators. We focused on those that could be normalized to provide for meaningful comparison from site to site, and for which data was likely available. For example, comparing the total energy consumed in one industrial park to the total energy consumed in another industrial park is not very meaningful. Comparing the total energy consumed per dollar of revenue generated makes more sense, especially if it can be further broken down per sector. The performance indicators were generally normalized per tonne of product; per dollar of revenue; per employee; or per hectare.

We also focused on performance indicators for which site-to-site comparison made sense. For example, while Total Tree Cover (measured as Total Area Covered in Trees / Total Site Size) makes sense when comparing sites within the same eco-region, it does not make much sense when comparing a site in coastal BC to a site in southern Saskatchewan. Similarly, while many performance indicators for residential and commercial activities are normalized per square metre of building space, this does not make sense in an industrial setting, where many industrial operations are outdoors. For example, chemical companies' operations consist of many miles of pipeline and other structures on site that are not contained in a single building. Normalizing per *hectare of operations* makes more sense.

A number of performance indicators were identified which would be useful for a single site to track its progress, although they would not necessarily allow the site to compare its progress towards sustainability to that of another site. However, these are still important indicators for site-wide initiatives. Table 1 provides some examples of indicators that can be used for comparing sites and those that are more useful for single site characterization.

Table 1: Indicators for Site-to-Site Comparison versus Single Site Characterization

Allow Site-To-Site Comparisons	Single Site Characterization
Total building energy consumed (GJ) Total building space (m^2 or ha)	Building energy consumption (GJ) Total energy consumed (GJ)
Total energy consumed (GJ) Total products (tonnes)	Total thermal energy (GJ) Product (tonnes)
	Total electric energy (GJ) Product (tonnes)
	Total transportation energy (L fuel) Product (tonnes)
Total Product (T) Total Material Inputs Consumed (T)	Total green certified material inputs (T) Product (T

[2] These are two of STSIB's Industrial Sustainability Team's priorities.

Finally, the scope of this project involved developing the indicators only. These performance indicators have not been field-tested or piloted.

2 BACKGROUND – RELATED PERFORMANCE INDICATORS

The following sections briefly summarize the current use of performance indicators in the areas of Eco-Industrial Networking; Eco-Efficiency; Corporate Annual Reporting; and Sustainable Communities. A detailed description of the performance indicators used in these areas may be found in Appendix A. These indicators formed the basis for the sustainable industries performance indicator framework presented in this report.

2.1 ECO-INDUSTRIAL NETWORKING & ECO-INDUSTRIAL PARKS

Eco-Industrial Networking (EIN) is an emerging practice that promotes sustainable industrial development and operations. EIN represents the implementation of the principles of industrial ecology, which require a systems approach and the application of lessons from nature e.g., biomimicry or the role of "scavenger and decomposer" businesses in facilitating the cycling of materials and energy. In practice, EIN involves building relationships or networks to share and more efficiently use resources such as municipal infrastructure, land, energy, and transportation. These networks largely involve businesses, but municipal governments and the wider community are increasingly involved. The result of EIN is increased business performance; reduced municipal infrastructure demand; reduced environmental impact; and promotion of green design for buildings, processes, and sites. Several projects across Canada have focused on retrofitting EIN into existing industrial parks to create eco-industrial parks. The North Vancouver Maplewood Project is an ongoing eco-industrial initiative that has recently reached the pre-implementation phase. The Town of Hinton, Alberta is developing a brand new eco-industrial park on the last piece of industrial-zoned land within town boundaries.

An Eco-Industrial Park (EIP) represents the application of EIN within an industrial park. In an EIP, businesses and their local government and community partners work together to incorporate

- Targeted economic development strategies (attracting businesses to fill product or service niches);
- By-product synergy (waste of one = feed for another);
- Ecological design (preserving ecologically sensitive areas and designing buildings and sites to minimize resource use);
- Green infrastructure (replacing traditional infrastructure with natural/alternative systems); and
- Networking around services (e.g. marketing, transportation, research and monitoring services).

This is a relatively new field, and performance measurement has been inconsistent. The use of performance indicators in industrial ecology / EIN has been limited, especially with respect to measuring the benefits from interactions between *groups* of businesses. Standard eco-efficiency indicators are used sometimes to report individual corporate results. The Norwegian Institute of Science and Technology's Industrial Ecology Programme looked at the application of eco-efficiency indicators to "recycling systems" by adapting the World Business Council for Sustainable Development eco-efficiency measurement framework[3]. They highlight the added complexities created by groups of businesses with different functions in a system; the importance of setting system borders; and the need to include

[3] Eik, 2001

both system-wide and business-specific indicators in an evaluation. A different approach was taken in a North American study when authors postulated a means to compare real and hypothetical eco-industrial parks and integrated biosystems using ecological food web theory (e.g. numbers of linear relationships between industrial tenants, and connectance values)[4]. Neither of these studies has resulted in a practical, field-tested set of performance indicators.

2.2 ECO-EFFICIENCY

The National Roundtable on the Environment and Economy (NRTEE) has developed a set of core and complimentary eco-efficiency indicators based on the World Business Council for Sustainable Development's seven elements of eco-efficiency:

- Reducing the material requirements for goods and services
- Reducing the energy intensity of goods and services
- Reducing toxic dispersions
- Enhancing material recyclability
- Maximizing sustainable use of renewable resources
- Extending product durability
- Increasing the service intensity of goods and services

The benefits of using eco-efficiency indicators can be realized by individual facility managers, corporate managers and a company's stakeholders[5]. While these indicators effectively characterize a single firm's performance, and allow comparisons between companies and across business sectors, they have not been used to measure the potential benefits of cooperation among businesses (e.g. within an industrial park or area).

2.3 CORPORATE ANNUAL REPORTING

Corporate annual reporting has evolved significantly in the past decade. Annual reports used to contain primarily financial information. More recently, increased public and stakeholder awareness has resulted in more firms adopting a triple bottom line approach and including social and environmental indicators in their annual performance evaluations. Other firms, such as those on the Dow Jones Sustainability Index, have expanded their corporate reporting requirements entirely, by adding annual sustainability and/or corporate social responsibility reports to their repertoire.

The indicators used in these reports are generally specific to the individual firm's operations. They are not used to compare one company to another and are therefore difficult to adapt to entire industrial sites or districts.[6] Appendix # provides a list of indicators used by heavy industry Canadian businesses that are listed on the Dow Jones Sustainability Index.

2.4 SUSTAINABLE COMMUNITIES

Several indicators have been developed to measure the sustainability of communities. Supporters of Smart Growth, "a collection of urban development strategies to reduce sprawl that are fiscally, environmentally and socially responsible"[7], have been especially diligent in their efforts to measure the performance of communities pursuing sustainability. However, the ten Principles of Smart Growth ignore a crucial component of every community:

[4] Hardy and Graedel, 2002
[5] NRTEE, 2001
[6] There are some examples where corporate indicators are used to compare performance at several distinct locations (e.g. multiple smelter sites for Alcan Inc.) so these may be more easily adapted.
[7] SmartGrowth BC, 2005. from SmartGrowth BC website www.smartgrowth.bc.ca.

industry. The BC Sprawl Reports (2001; 2004)[8,9] began with the identification of a need for "objective information on the nature and extent of sprawl in BC, and how it impacts the ability of BC communities to achieve their goals". These works quantify a community's urban form, livability, and economic vitality and, more recently, evaluates relationships (e.g. correlations) between them. These indicators, (e.g. density of housing units; bookstores/art galleries per 10,000 people) focus mainly on residential and commercial aspects of communities. Industrial areas were only indirectly considered, and only for a small number of measures (e.g. % of commuters who drive 5km or less).

3 SUSTAINABLE INDUSTRIES PERFORMANCE INDICATORS FRAMEWORK

3.1 GETTING STARTED

3.1.1 Defining the Site

One of the key first steps is to define the boundaries of the site. The word "site" is meant to refer to any geographically bound collection of businesses. To make site-to-site comparison meaningful, it is important that site boundaries are chosen in a similar manner. This performance indicator framework assumes that the site is defined as follows:

- The site is a geographically bound collection of businesses, where many of those businesses are industrial in nature (light, medium or heavy). An individual industrial park / estate or business park would be considered as a site. A site could also refer to an industrial area in a community (e.g., land that is zoned industrial).
- Where large parts of the industrial area remain undeveloped, the site should be defined as the developed area only. Otherwise, results normalized to a per hectare basis will not accurately reflect the businesses' activities.
- If the industrial area is adjacent to areas that are not developable (poor land quality; protected ecological reserves, etc), then the undevelopable areas should not be included in the site. For example, including Burns Bog[10] in the Tilbury Industrial Area calculations would make it appear as though energy consumption per hectare at this site is extremely low, which may not be the case. Small, undevelopable areas that are clearly within site can be included.

3.1.2 Information Needs

The first part of the framework, shown in Table 2 below, is a list of information needed to calculate the sustainable industries performance indicators. Potential data sources for the information have been noted. Table 2 also lists the unit of measure to which the information must be converted. For consistency, metric units of measure have been used. Larger scale units (e.g. MW versus Kw) were chosen as aggregate values over several businesses are likely to be large numbers. Smaller units of measure, or even American units (BTU, ft^2, ton), could be used instead, as long as the units of measure are consistent throughout.

[8] Alexander, Donald and Ray Tomalty. 2001. BC Sprawl Report. Vancouver: Smart Growth BC.
[9] Alexander, Donald, Tomalty, Ray and Mark Anielski. 2004. BC Sprawl Report – Economic Vitality and Livable Communities. Vancouver: SmartGrowth BC.
[10] Burns Bog is a 4000ha domed peat bog located to the south of Tilbury Industrial Area. More than half of this site is protected as an Ecological Conservancy Area.

Table 2: Information Needs & Potential Data Sources for Performance Indicators

Information Type	Unit of Measure*	Useful to Individual Company or to Individual Site	Calculation	Data Sources
Overall Financial				
Total Gross Revenues Generated	$	Y	Sum of each business' revenues	Individual businesses (Cost, production, or sales reports; Annual financial reports)
Total Employees	# FTE	Y	Sum of each business' number of employees. Where shift or part-time work is prevalent, it may make sense to convert to Full-Time Equivalents.	Individual business data. Baseline from economic development documents may be available.
Total # Businesses	#	Y	Count of number of businesses in the list.	Municipal business license lists or Scott's Directories listings for a given geographic area.
Energy				
Total Energy Consumed	GJ $	Y	Total Thermal Energy + Total Electrical Energy (converted to GJ)	Utility Companies: (Electricity and/or Natural Gas) or Fuel Providers (Diesel, Heating Oil, Propane, Hog Fuel, etc) may provide aggregate Consumed data for given area or set of addresses. Municipal business permit or tax role lists can provide addresses. When natural gas isn't the main fuel, the calculation can be complex. There could be multiple fuel suppliers, and conversion to GJ may be required e.g., from T hog fuel. In this case, it is much more likely that individual business data will be required. This would include waste heat recovered internally that offsets other thermal energy use, or waste heat delivered to other businesses. For electricity, include traditional and green power consumption. Municipal GIS data, or manual measurements from air photos or maps can provide area sizes for utility company queries. Individual Businesses: Purchasing records; Energy audits; Facility management reports; Estimates based on known production.
Total Building Energy Consumed	GJ $	Y	Sum of energy used to heat / cool / light buildings.	Estimates based on known building footprints and types, and factors available from programs like RETSCREEN. Individual business data, especially from facilities staff. Does not include energy used for other operations such as pumping water or providing heat for manufacturing processes.

Table 2: Information Needs and Potential Data Sources for Performance Indicators, *continued*

Information Type	Unit of Measure*	Useful to Individual Company or to Individual Site	Calculation	Data Sources
Total Green Energy Consumed	GJ	Y	Sum of the Total Green Thermal Energy Consumed and Total Green Electrical Energy Consumed per business (converted to GJ)	Utility company data e.g., green power sales within a given area. Individual business info e.g., purchasing records for green power. This would include green energy a company generates and uses itself, as well as green energy generated and sold to other customers. It may make sense to define green energy according to the local utility definition. Generally, it would encompass renewable energy, energy generated from waste; or energy recovered e.g., heat exchange networks.
Total Energy Generated	GJ $	Y	Sum of the total thermal and electrical energy generated per business (converted to GJ)	Utility company data, especially if companies must sell to the grid; Utility Commission permits; individual company info. Includes thermal and electrical, green and conventional. Does not include Waste Heat, unless it is being recovered internally or sold to another business.
Total Energy Losses	GJ $	Y	Sum of the total energy losses per business.	The amount of energy "lost" in the site, representing a potential value-added resource. Normally, this requires an energy audit and balance per company, which can get complicated. For most companies, energy losses will be estimated to equal waste heat generated.
Total Waste Heat Generated	GJ $	Y	Sum of the waste heat generated per business.	Data from individual businesses. An energy balance is usually required to determine this per business. Subtract waste heat re-used internally or used by another company e.g., this is waste heat generated representing potential recovery opportunities.
Total Green Energy Generated	GJ	Y	Sum of the total green thermal and green electrical energy generated (converted to GJ)	Utility company data, especially if businesses must sell to the grid; Utility Commission permits; individual business info. Green energy may include heat and/or electricity from biomass, geothermal, solar, wind, micro-hydro, waste process energy.
Total GHG Emissions	T Eco2	Y	Sum of GHG emissions per business (converted to Eco2). See Canada's Climate Change Plan for methodology.	Individual business data (Utility bills; Fuel invoices; Plant survey; EHS records; Estimation or calculation); Voluntary Challenge & Registry data. Consider GHG emissions from fuel combustion, process reactions and treatment processes, including CO2, CH4, N20, HFCs, PFCs and SF6 (excluding GHG emissions released in generation of purchased electricity)

Table 2: Information Needs and Potential Data Sources for Performance Indicators, *continued*

Information Type	Unit of Measure*	Useful to Individual Company or to Individual Site	Calculation	Data Sources
Total # Businesses Reducing Energy	#	N	Count of total positive responses	Business survey responses. Measure # businesses reducing energy since baseline year.
Total Transportation Energy Consumed	$ L GJ	Y	Break down by type if possible.	Individual business records. How much fuel is consumed by corporate fleets, converted to GJ (you can't add L of gasoline to L of diesel). Only use L if you are going to track each fuel type separately, and calculate each indicator related to Total Transportation Energy Consumed per fuel type. If accurate commuting data is available, you may be able to estimate fuel associated with private employee transportation, but this is not likely.
Total Green Transportation Energy Consumed	$ L GJ	Y	Sum of transportation energy consumed per business (converted to GJ). Break down by type if possible.	Individual business records. Would include biodiesel, ethanol, hydrogen, possibly natural gas. See comments for Total Transportation Energy Consumed
Materials				
Total Products	T	Y	Sum of total products from each business.	Sales records from companies. Estimates from: annual reports, Scotts Directories, plant specifications. For warehouses, this would be tonne of product shipped. For service providers only, their productive outputs will be captured as revenue.
Total Non-Products (By-Products & Waste)	T	Y	Sum of total non-products from each business.	Various records from companies (waste manifests, internal monitoring). Estimates from: mass balance calculations, plant specifications (e.g., probable non-product output given rated production). Note that Total Non-Products should equal Total By-Products + Total Waste, and should also equal Total Raw Materials Consumed + Total Water Consumed – Total Products – Total Wastewater Generated, with water and wastewater converted to alet.
Total By-Products	T	Y	Sum of total by-products produced per business.	Various records from companies (waste manifests, internal monitoring). Estimates from: mass balance calculations, plant specifications (e.g., probable non-product output given rated production). By-Products are former wastes for which some value has been discovered. By-Products would include wastes that are recycled, re-used, re-processed, and/or distributed as inputs for another business. Wastes are those output materials for which disposal (or loss in the case of air emissions) is the current management method.

Table 2: Information Needs and Potential Data Sources for Performance Indicators, *continued*

Information Type	Unit of Measure*	Useful to Individual Company or to Individual Site	Calculation	Data Sources
Total Waste Generated	T	Y	Sum of total waste produced per business.	Various records from companies (waste manifests, internal monitoring). Estimates from: mass balance calculations, plant specifications (e.g., probable non-product output given rated production). By-Products are former wastes for which some value has been discovered. By-Products would include wastes that are recycled, re-used, re-processed, distributed as inputs for another business. Wastes are those output materials for which disposal (or loss in the case of air emissions) is the current management method.
Total Ozone Depleting Substance (ODS) Emissions	T Ecfc	Y	Sum of total ODS emissions per business.	Indiv businesses (Plant surveys; EHS reports; Estimation or calculation). Refer to amount of ODS emissions to air from processes and losses/replacement from containments (chillers).
Total Acidification Emissions to Air	T Eso2	Y	Sum of total acidification emissions per business	Indiv businesses (Plant surveys; EHS reports; Estimation or calculation). Could be very roughly estimated per company based on type of operation per company. Estimate amount of acid gases and acid mists emitted to air (including NH3, HCl, HF, NO2, SO2 and sulfuric acid mists) from fuel combustion, process reactions and treatment processes
Total Raw Materials Consumed	T	Y	Sum of total raw materials consumed per business (excluding water and fuel)	Indiv businesses (Procurement files; Manufacturing reports; Cost reports). Could roughly estimate based on sector research and known total production per company or sector. Include materials purchased or obtained by businesses including: • raw materials for conversion • other process materials (such as catalysts, solvents) • pre- or semi-manufactured goods and parts excluding packaging
Total Material Inputs	T	Y	Sum of total material inputs per business	Indiv businesses (Procurement files; Manufacturing reports; Cost reports). Could roughly estimate based on sector research and known total production per company or sector. Materials include list above plus water, packaging, alettes, office supplies, etc.
Total # Businesses Reducing Materials Consumption	#	Y	Count of total positive responses	Business survey responses and/or data collected for other materials measures. Measure # businesses reducing materials consumption per tonne of production since baseline year.

Table 2: Information Needs and Potential Data Sources for Performance Indicators, *continued*

Information Type	Unit of Measure*	Useful to Individual Company or to Individual Site	Calculation	Data Sources
Water (Potable, Non-Potable, Storm, Waste)				
Total Water Consumed	m3	Y	Sum of all water consumed by each business	Water utility / municipal billing records. Individual business info. Includes potable and non-potable, municipal and non-municipal supplies. Includes water for sanitary use, process operations, cooling, cleaning, and maintenance.
Total Potable Water Consumed	m3	Y	Sum of all potable water consumed by each business.	Water utility / municipal billing records. Individual business info. For most sites, this will equal water purchased from municipal sources since municipalities don't yet commonly supply non-potable water.
Total Non-Potable Water Consumed	m3	Y	Sum of all non-potable water consumed by each business.	Individual business data. Includes stormwater, groundwater, recycled process water or wastewater, cascaded wastewater. Equal to Total Water Consumed minus Total Potable Water Consumed, if that data is available.
Total Stormwater Consumed	m3	Y	Sum of all stormwater consumed by each business.	Individual business data.
Total Wastewater Generated	m3	Y	Sum of all wastewater generated by each business.	Individual business info. Local wastewater discharge permit authority may have data for permitted industries. Could be roughly estimated as % of Total Water Consumed (e.g., the GVRD estimates this at 80% for its permitted industries)
Total Sanitary Wastewater Generated	m3	Y	Sum of (# Employees * Sanitary Wastewater Generated Per Employee) per business.	# Employees: individual business info. Per Employee Generation: The local or regional government may have estimates for average sewage generation per employee in the area.
Total Process Wastewater Generated	m3	Y	Sum of all process wastewater generated by each business.	Individual business data. Considered as wastewater leaving the site for discharge. Does not include wastewater internally recycled or delivered to another business for re-use.
Total Water & Sewer Line	km	Y	Total Water Line Length + Total Sewer Line Length	Municipal GIS data and public works staff. Can be estimated by measuring length of utility corridors known to contain water and sewer lines.
Total # Businesses Reducing Water Consumption	#	N	Count of total positive responses	Business survey responses. Measure # businesses reducing water per tonne of product since baseline year.

Table 2: Information Needs and Potential Data Sources for Performance Indicators, *continued*

Information Type	Unit of Measure*	Useful to Individual Company or to Individual Site	Calculation	Data Sources
Land Use				
Total Site Size	ha	Y	Measurement	Municipal government should be able to determine from GIS, land titles, etc. This should indicate the total DEVELOPABLE area. For example, if the industrial park is adjacent to a large conservation area, do not include the conservation area. For sites with significant area still undeveloped, it may make sense to substitute the currently developed area.
Total Building Area	ha	Y	Sum of building area per business.	Municipal data, especially linked to building permits can usually be generated per address or from GIS. Measure of the total amount of building space in the site. (Building area > footprint for buildings with more than one storey)
Total Impervious Area	ha	Y	Sum of impervious area per business.	Municipal GIS data (especially linked to building permits), aerial photographs, individual business info. Includes roofs (except green roofs), parking, and roads (except where pervious materials are used)
Total Parking Area	# spots ha	Y	Sum of parking area per business	#: can be estimated based on zoning requirements. More accurate data from building / development permits of individual businesses. Include parking on individual sites as well as any shared parking e.g., park-and-ride facilities.
Total Greenspace	ha	Y	Measurement	Municipal GIS data (especially linked to building permits), aerial photographs, individual business info. Include landscaped / vegetated areas (public and private) such as parks, as well as green roofs.
Total Natural Area	ha	N	Measurement	Review of aerial photographs and/or site visits by qualified ecologist / naturalist/ biologist, etc. to determine the area that retains pre-development ecosystem function.

Table 2: Information Needs and Potential Data Sources for Performance Indicators, *continued*

Information Type	Unit of Measure*	Useful to Individual Company or to Individual Site	Calculation	Data Sources
Corporate & Municipal Policy				
Municipal Plans	-	-	-	Community / Development; Transportation; Stormwater Management; Energy; Air Quality Management; Liquid Waste Management; Solid Waste Management; etc Plans. Available from municipal websites, municipal staff. Will be used to assess how well the municipal policy framework supports Sustainable Industries. Can also help the business community to determine how well it is complying with municipal sustainability objectives.
Corporate Reports	-	-	-	Annual, Sustainability, Corporate Social Responsibility, Environment Reports. Available from company websites, company staff. Will be used to assess how well the corporate policy framework supports EIN and sustainability.
Committee / Project Reports for Site-Wide EIN or Sustainable Industry Initiatives	-	-	-	Municipal websites. Actual project / initiative websites, reports, newsletters. Interviews with Advisory Committees, etc.
Total # Sustainability Reports			Count of total positive responses	Individual business interviews / surveys. Business websites might also indicate whether or not a report is prepared. Reflects annual, externally audited, environment / sustainability / CSR reports.
Total # Businesses with Supportive Corporate Policies	#		Count of total positive responses	Individual business interviews / surveys. Business websites might also indicate whether or not a report is prepared. Review documents for formal sustainability or EIN policies. Could also include policies related to cleaner production, zero waste, or Natural Step.
Total # Businesses Returning Surveys	#		Count of total positive responses	Individual business interviews / surveys recommended for much of this data collection.
Total # Businesses with Supportive Corporate Objectives	#		Count of total positive responses	Individual business interviews / surveys. Business websites might also indicate whether or not a report is prepared. Review documents for formal sustainability or EIN objectives / targets related to the policies. Could also include objectives related to cleaner production, zero waste, or Natural Step.

Table 2: Information Needs and Potential Data Sources for Performance Indicators, *continued*

Information Type	Unit of Measure*	Useful to Individual Company or to Individual Site	Calculation	Data Sources
Total # Businesses with CSR Policies	#		Count of total positive responses	Individual business interviews / surveys. Business websites might also indicate whether or not a report is prepared. Look for businesses that have a corporate social responsibility mandate (e.g. measure their performance using the Good Company guidelines).
Total # Certified Businesses	#		Count of total positive responses	Individual business interviews / surveys. Business websites might also indicate whether or not a report is prepared. The number of businesses that are formally certified (ISO 14001, Forest Stewardship Council, Canadian Standards Association, other formal programs). If there is a site-wide EMS, then count the number of businesses officially participating.
Total # Local Supply Chain Members	#		Count of total positive responses	Individual business interviews / surveys asking how many suppliers and customers each business has within 500 km.
Transportation				
Total # Fleet Vehicles	#	Y	Sum of total # fleet vehicles per business	Individual business interviews / surveys. Consider vehicles over which businesses have direct control. Could include a breakdown by type of vehicle.
Total # Alternative Fleet Vehicles	#	Y	could include a breakdown by type	Individual business interviews / surveys. Alternative vehicles are those that are physically modified from a traditional vehicle e.g., if a company is using biodiesel in a vehicle with a conventional diesel engine, then the vehicle is not alternative. If the engine has been modified to use hydrogen fuel, then it's an alternative vehicle. Hybrid engine vehicles are considered alternative.
Total # Bicycle Facilities	#	Y	could include a breakdown by type e.g., bike rack; dry, secure bike storage; showers	Individual business interviews / surveys. Consider secure bicycle storage facilities and on-site showers and changing rooms.
Total Road Right-of-Way	ha	N	Direct measurement	Municipal GIS data. Manual measurement. The amount of the site dedicated to roads (not including within individual business sites)
Total Non-Vehicle Right-of-Way	ha	N	Direct measurement	Municipal GIS data. Manual measurement. The area of bike paths, sidewalks, and recreational trails that provide safe access to the site.

Table 2: Information Needs and Potential Data Sources for Performance Indicators, *continued*

Information Type	Unit of Measure*	Useful to Individual Company or to Individual Site	Calculation	Data Sources
Total Employees with Green Commute	#	Y	Sum of # employees with green commute per business.	Employee surveys for individual businesses. The number of employees who more often than not get to work any way other than in a single-occupant-vehicle. This would include carpooling, biking, walking, rollerblading, and public transit. A breakdown by commute type would be useful.
Individual Business Median Commute Length	km		median of all employee commute lengths	Employee surveys for individual businesses. Reflects the most frequent distance each employee commutes.
Distances to Alternative Fuel Service Stations	km	-	Direct measurement	GIS-based maps would be most useful. Alternatively, average distance from closest site boundary and furthest site boundary to alternative fuel service station(s). This determines how far businesses have to go to fill their vehicles with alternative fuel (biodiesel, ethanol, hydrogen), and therefore, how easy it is to use alternative fuel.
Total # Businesses Walking Distance to Public Transit	#	N	Direct measurement	GIS-based maps would be most useful. Public transit maps. Count the number of businesses within 400 m of public transit. Without GIS, this could be a time consuming calculation.
Total # Businesses Walking Distance to Key Services	#	N	Direct measurement	GIS-based maps would be most useful. Other site / municipal maps. Count the number of businesses within 400 m of commercial services (banks, restaurants, day care, medical offices). Without GIS, this could be a time consuming calculation.
Total # Businesses Walking Distance to Green Space	#	N	Direct measurement	GIS-based maps would be most useful. Other site / municipal maps. Count the number of businesses within 400 m of green space or trails. Without GIS, this could be a time consuming calculation.
Ecological Functions				
Total Greenspace	ha	Y	Direct measurement	Municipal and regional data and plans. The amount of greenspace in an industrial area or park. This greenspace is not necessarily ecologically significant; however, it is important for employee recreation, stormwater infiltration, and maintaining green corridors throughout a municipality. This includes protected lands.
Eco-Industrial Network-Specific				

Table 2: Information Needs and Potential Data Sources for Performance Indicators, *continued*

Information Type	Unit of Measure*	Useful to Individual Company or to Individual Site	Calculation	Data Sources
List of Business By Sector	-	-	Data manipulation will be required.	Scott's directories; Municipal business license data; Chambers of Commerce or Economic Development Corporations. Calculating all indicators per sector can help to really pinpoint progress and challenges, and to prioritize action items.
Total Green Building Area	m2	Y	Sum of area for all green buildings in the site.	Individual business interviews; community green building inventories if they exist. Consider building space that meets Industrial Buildings Incentive Program (IBIP) or Commercial Buildings Incentive Program (CBIP) criteria, or Model National Energy Code or Leadership in Environmental Excellence and Design (LEED™) Certified standards. Note that there is currently no LEED™ standard for industrial facilities.
Total # Businesses Sharing Services (with other businesses on-site)	#	N	Count of total positive responses	Individual business interviews / surveys re: whether businesses are establishing EIN around services (logistics, training, marketing, research, etc)
Total # Businesses Sharing Facilities (with other businesses on-site)	#	N	Count of total positive responses	Individual business interviews / surveys. Consider whether businesses are establishing EIN around facilities (e.g., sharing a warehouse or classroom). Could also include use of site facilities such as a business incubator or fitness centre.
Total # Businesses Receiving Raw Materials or Shipping Product on Site (from one business to another on-site)	#	N	Count of total positive responses	Individual business interviews / surveys. Consider EIN around materials excluding by-products (e.g., supply chain relationship)
Total # Businesses Receiving By-Products On Site (from another businesses on-site)	#	N	Count of total positive responses	Individual business interviews / surveys.
Total # Businesses Receiving Energy On Site (from another businesses on-site)	#	N	Count of total positive responses	Individual business interviews / surveys. Include businesses establishing EIN around energy (e.g., receiving energy from distributed generation or receiving waste heat from another business)

Table 2: Information Needs and Potential Data Sources for Performance Indicators, *continued*

Information Type	Unit of Measure*	Useful to Individual Company or to Individual Site	Calculation	Data Sources
Total # Recycling Based Businesses	#	N	Count of total positive responses	Individual business interviews / surveys. Include recycling, repair, remanufacture, reprocessing, and resale businesses. Business lists with sector descriptions will help, but some businesses may be missed.
Total # Businesses with Green Procurement Policies	#	N	Count of total positive responses	Individual business interviews / surveys (some data collection via business websites may be possible). Green procurement usually involves an LCA approach to both product purchase decisions, and to managing the entire corporate supply chain. The quality or extent to which the policy is implemented are not considered, and are difficult to measure.
Community				
Total # Businesses Making Community Donations	#	N	Count of total positive responses	Individual business interviews / surveys (some data collection via business websites may be possible). This should refer to donations to organizations (non-profits / non-governmental organizations, educational institutions) operating within a certain distance of the site, as opposed to donations to national programs.
Total $ Donated to Community	$	N	Count of total positive responses	Individual business interviews / surveys (some data collection via business websites may be possible). This should refer to donations to organizations (non-profits / non-governmental organizations, educational institutions) operating within a certain distance of the site, as opposed to donations to national programs.
Total # Volunteer Hours	#	Y	Count of hours	Individual business interviews / surveys (some data collection via business websites may be possible)
Total # Break-Ins	#	N	Count of total positive responses	Individual business interviews / surveys. The local police detachment may have records.
Total # Odour Complaints	#	N	Count of total positive responses	Individual business interviews / surveys. The local municipal or regional regulators may have records.
Total # Light Pollution Strategies	#	N	Count of total positive responses	Individual business interviews / surveys. The local municipal or regional regulators may have records.
* Assume Annual Basis where appropriate				

3.2 PROPOSED INDICATORS

The proposed sustainable industry performance indicator framework is shown in Table 3 on the following pages. Table 3 lists the following information:

- name of each indicator;
- whether progress is indicated by an increasing or decreasing value;
- whether a median rather than a straight mean is useful;
- how the indicator is calculated using the information assembled according to Table 3;
- what the indicator means; and
- whether the indicator addresses the economic, social, or environmental aspects of sustainability.

There are 72 indicators in the framework. They have been divided into the following categories, with the number of indicators per category shown in parentheses:

- Overall Production / Financial (4)
- Energy (14)
- Materials (7)
- Water – Potable, Non-Potable, Storm, Wastewater (8)
- Land Use and Transportation Infrastructure (13)
- Corporate and Municipal Governance (11)
- Eco-Industrial Networking Specific (10)
- Community (5)

It is worth noting again that this framework of indicators is not comprehensive, but does represent indicators that allow for site-to-site comparison and for which data is likely available.

Table 3: Proposed Sustainable Industries Performance Indicators Framework

Performance Indicator	Units (Annual Basis)	Direction of Progress	Median Across Site Useful?	Useful for Individual Business?	Calculation	What the Indicator Tells You	Sustainability Components		
							Economic	Social	Environmental
Overall Production / Financial									
Employee Productivity	$ / #	↑	N	Y	Total Gross Revenues Generated / Total Employees	How effectively labour is generating revenue. This indicator could be misleading / contentious as in some cases, job cut-backs could indicate progress. Nonetheless, from the businesses' perspective, this could provide a general measure of productivity from one site to another.	X		
Productivity	$ / T	↑	N	Y	Total Gross Revenues / Total Products	How profitable operations are. An increase could reflect a shift to the production of higher value-added products, although it could just reflect changing market conditions. A per sector breakdown could also be useful when comparing sites.	X		
Economic Generation	$ / ha	↑	N	Y	Total Gross Revenues / Total Site Size	The amount of land being used to generate a certain amount of revenue. Economic development strategies often have targets related to this indicator. It partially demonstrates how well land is being used to support the local economy. Progress is roughly related to curbing sprawl.	X		
Jobs Density	# / ha	↑	Y	Y	Total Employees / Total Site Size	How well the site is providing jobs. Many economic development strategies call for increasing job density, the number of jobs that a hectare of land provides. This doesn't reflect the quality of the jobs.	X	X	
Energy									
Energy Intensity - Economic	GJ / $	↓	Y	Y	Total Energy Consumed / Total Gross Revenues Generated	How much energy is required to generate revenue. This could reflect progress of individual businesses in improving energy efficiency and intensity, although it could also reflect the addition or closing of energy-intensive businesses	X		X

Table 3: Proposed Sustainable Industries Performance Indicators Framework, *continued*

Performance Indicator	Units (Annual Basis)	Direction of Progress	Median Across Site Useful?	Useful for Individual Business?	Calculation	What the Indicator Tells You	Sustainability Components		
Energy Intensity - Spatial	GJ / ha	↓	N	Y	Total Energy Consumed / Total Site Size	Sites that reduce the amount of energy they consume per hectare are likely helping the overall municipality work towards energy reduction targets in community energy plans. When comparing sites in a given municipality, this indicator might help to prioritize locations for distributed / renewable energy projects.	X		X
Energy Intensity - Production	GJ / T	↓	Y	Y	Total Energy Consumed / Total Products	How much energy businesses need to make their products. Note that decreasing Energy Intensity could still reflect an overall increase in energy Consumed and/or greenhouse gas emissions.	X		X
GHG Emission Intensity	T / T	↓	Y	Y	Total GHG Emissions / Total Products	Amount of GHG emissions to air from fuel combustion, process reactions and treatment processes, including CO2, CH4, N20, HFCs, PFCs and SF6 (excluding GHG emissions released in generation of purchased electricity) per tonne of product produced at the site. This generally provides a measure of a site's use of green energy as well (more green energy use should reduce the indicator).	X		X
Energy Efficiency	GJ / GJ	↑	Y	Y	Total Energy Consumed / Total Energy Losses	How much energy entering the site actually gets used versus how much is lost (e.g., heat up stacks, mechanical losses in moving parts, energy unrecovered from high temperature wastewater discharges). This is generally difficult to calculate, as it requires each business to complete an energy balance around their operations to accurately determine waste heat.	X		X
Energy Reduction Participation	# / # (%)	↑	N	N	Total # Businesses Reducing Energy / Total # Businesses	How widespread participation in energy-related initiatives is.	X	X	
Green Energy Intensity - Production	GJ / T	↑	Y	Y	Total Green Energy Consumed /	How much green energy businesses are using in their production processes. If the overall Energy Intensity is increasing at the same time, then the actual progress	X		X

Table 3: Proposed Sustainable Industries Performance Indicators Framework, *continued*

Performance Indicator	Units (Annual Basis)	Direction of Progress	Median Across Site Useful?	Useful for Individual Business?	Calculation	What the Indicator Tells You	Sustainability Components		
					Total Products	indicated by increasing Green Energy Intensity is diminished.			
Energy Self-Sufficiency	GJ / GJ (%)	↑	Y	Y	Total Energy Generated / Total Energy Consumed	In theory, this could indicate how good a site is at meeting all its energy needs on-site. This could unfairly skew sites containing old, traditional generating stations, but it is a useful high-level comparison.	X		X
Green Energy Mix	GJ / GJ (%)	↑	Y	Y	Total Green Energy Consumed / Total Energy Consumed	How much green energy businesses are purchasing in the site. One large consumer switching to green energy could skew the resutls, but taken in context with several other indicators, this is still a useful comparison.	X		X
Green Energy Self-Sufficiency	GJ / GJ (%)	↑	Y	Y	Total Green Energy Generated / Total Green Energy Consumed	See above.	X		X
Building Energy Efficiency	GJ / ha	↓	Y	Y	Total Building Energy Consumed / Total Building Area	How energy efficicient buildings are. This indicator is especially useful as a mean. Site to site comparison should consider different climatic conditions, but it's still a useful comparison.	X		X
Transportation Fuel Efficiency	GJ per vehicle	↓	Y	Y	Total Transportation Energy Consumed / Total # Fleet Vehicles	How much energy (fuel) vehicles need. This indicator doesn't account for varying fleet types from site to site e.g., the fleet in one site might largely comprise pick-up trucks, while on another site, might comprise tractor trailers. Using the median value across the businesses would be more effective.	X		X
Green Transportation Energy Mix	GJ / GJ	↑	Y	Y	Total Green Transportation Energy Consumed / Total	The extent to which businesses have been able to substitute green fuels e.g., ethanol for gasoline or biodiesel for diesel.	X		X

Table 3: Proposed Sustainable Industries Performance Indicators Framework, *continued*

Performance Indicator	Units (Annual Basis)	Direction of Progress	Median Across Site Useful?	Useful for Individual Business?	Calculation	What the Indicator Tells You	Sustainability Components		
					Transportation Energy Consumed				
Alternative Fueled Fleets	# / # (%)	↑	Y	Y	Total # Alternative Fleet Vehicles / Total # Fleet Vehicles	How well businesses have done at introducing alternative vehicles to their fleets.			X
Materials (Note: For sites with significant service providers, replace Total Product with Total Gross Revenues)									
Product to Non-Product Ratio	#	↑	Y	Y	Total Products / Total Non-Products	For efficiecnt operations, this number should be high i.e., most of the materials consumed end up in product. This is a different, but sometimes more effective way, of demonstrating materials efficiency.	X		X
Materials Efficiency - Total	T / T	↑	Y	Y	Total Products / Total Material Inputs Consumed	How much of the materials input into the site actually end up as product. This number will approach 1 (or 100%) as operations become more efficienct.	X		X
Materials Efficiency - Raw Materials	T / T	↑	Y	Y	Total Products / Total Raw Materials Consumed	How much of the materials input into the site actually end up as product. This number will approach 1 (or 100%) as operations become more efficienct.	X		X
Waste Disposal	T / T (%)	↓	Y	Y	Total Waste Generated / Total Non-Products	Total amount of substances that are disposed of from all businesses within an industrial park.	X	X	X
By-Product Utilization	T / T (%)	↑	Y	Y	Total By-Products / Total Non-Products	The total amount of waste materials that are reused within an industrial park/area (or by another local company) as a percentage of the total waste generated by businesses in the park.	X		X

Table 3: Proposed Sustainable Industries Performance Indicators Framework, *continued*

Performance Indicator	Units (Annual Basis)	Direction of Progress	Median Across Site Useful?	Useful for Individual Business?	Calculation	What the Indicator Tells You	Sustainability Components		
Materials Reduction Participation	# / # (%)	↑	N	N	Total # Businesses with Reduced Materials / Total # Businesses	How widespread participation in materials-related initiatives is.	X	X	X
ODS Emission Intensity	T / T	↓	Y	Y	Total ODS Generated / Total Products	Amount of ODS emissions to air from processes and losses/replacement from containments (chillers) across all businesses within an industrial park produced per tonne of product made.	X	X	X
Acidification Emission Intensity	T / T	↓	Y	Y	Total eSO2 Generated / Total Products	Amount of acid gases and acid mists emitted to air (including NH_3, HCl, HF, NO_2, SO_2 and sulfuric acid mists) from fuel combustion, process reactions and treatment processes per tonne of product made.H4			X
Water (Potable, Non-Potable, Storm, Waste)									
Sewer / Water Infrastructure Intensity	km / ha	↓	Y	Y	Total Water & Sewer Line / Total Site Size	Kms of sewer and water infrastructure in a given industrial area per # of employees. Through EIN opportunities, businesses should be able to share this infrastructure, reducing the load requirement and need for infrastructure.	X	X	X
Impervious Surface Intensity	ha / ha (%)	↓	Y	Y	Total Impervious Surface / Total Site Size	% of industrial area that is impervious surface, including rooftops. This indicator correlates to the amount of stormwater runoff that the industrial area generates. More ecological stormwater management generally dictates a reduction in impervious surface. The exception would be areas where infiltration is not prudent. In that case, better stormwater management would be captured in the Stormwater Utilization indicator.	X		X
Water Use Intensity	m3 / T	↓	Y	Y	Total Water Consumed / Total Products	The amount of water consumed by all businesses within an industrial park per unit of product. This indicator could also be measured using area of land occupied for individual operations as a denominator.		X	X

Table 3: Proposed Sustainable Industries Performance Indicators Framework, *continued*

Performance Indicator	Units (Annual Basis)	Direction of Progress	Median Across Site Useful?	Useful for Individual Business?	Calculation	What the Indicator Tells You	Sustainability Components		
Water Reduction Participation	# / # (%)	↑	N	N	Total # Businesses with Reduced Water Consumption / Total # Businesses	How widespread participation in water-related initiatives is.		X	X
Stormwater Utilization	m3 / m3 (%)	↑	Y	Y	Total Stormwater Consumed / Total Water Consumed	How well businesses in the site are recovering and using stormwater to displace potable water.	X		X
Potable Water Utilization	m3 / m3 (%)	↓	Y	Y	Total Potable Water Consumed / Total Water Consumed	How much potable (drinking) water businesses in the site are using. Potable water is becoming more and more scarce, and more costly to provide.	X	X	X
Non-Potable Water Utilization	m3 / m3 (%)	↑	Y	Y	Total Non-Potable Water Consumed / Total Water Consumed	How well businesses are substituting non-potable water for potable water in their operations. This indicator will also rise as more businesses establish internal water recycling, or business-business wastewater cascades.	X		X
Wastewater Discharge Intensity	m3 / T	↓	Y	Y	Total Wastewater Generated / Total Products	The amount of wastewater discharged per unit of production could be summed across all businesses in an industrial park, as long as indiv businesses track their water discharges. Some municipalities, however, track the heavy dischargers.	X	X	X
Land Use & Transportation Infrastructure									
Natural Habitat Density	ha / ha (%)	↑	Y	N	Total Natural Area / Total Site Size	To reflect the amount of greenspace in an industrial area or park. This greenspace is not necessarily ecologically significant, however, it is important for employee recreation / workplace quality, stormwater infiltration, and maintaining green corridors throughout a		X	X

Table 3: Proposed Sustainable Industries Performance Indicators Framework, *continued*

Performance Indicator	Units (Annual Basis)	Direction of Progress	Median Across Site Useful?	Useful for Individual Business?	Calculation	What the Indicator Tells You	Sustainability Components		
						community. Greenspace may or may not improve / provide habitat.			
Open Space Density	ha / ha (%)	↑	N	N	(Total Greenspace + Total Non-Vehicle Right-of-Way) / Total Site Area	Reflects the amount of open space (public and private) in the site. Open space is commonly tracked for sustainable communities, and is a commonly used land-use designation.		X	X
Median Distance to Neighbouring Business	m	↓	Y	N	Measure distance between centres of main operations on abutting properties.	Whether or not building / operation massing has been planned to increase the potential for eco-industrial networking.	X	X	X
Road Density	ha / ha (%)	↓	N	N	Total Road Right-of-Way / Total Site Area	How well transportation has been planned in the site; how much land has been consumed by road ways. Congestion could be an issue not reflected in a good score for this indicator.			X
Pedestrian & Bicycle Friendliness	ha / # employees	↑	N	N	Total Non-Vehicle Right-of-Way / Total # Employees	How pedestrian friendly the site is. Hectares of sidewalks, bike paths, and trails per employee.		X	X
Bicycle Facilities	# / #	↑	N	Y	Total # Bicycle Facilities / Total # Businesses	How many individual businesses make it easy for employees to bike to work by making sure there are secure storage facilities and showers.			
Parking Intensity	ha / # or # / #	↓	Y	N	Total Parking Area / Total # Employees	An eco-industrial park's approach could include minimizing parking and sharing parking facilities where possible. This indicator would also correlate to the amount of impervious surface in an industrial park,		X	X

Table 3: Proposed Sustainable Industries Performance Indicators Framework, *continued*

Performance Indicator	Units (Annual Basis)	Direction of Progress	Median Across Site Useful?	Useful for Individual Business?	Calculation	What the Indicator Tells You	Sustainability Components		
						which affects stormwater loads, and amount of emplo			
Green Commuters	# / # (%)	↑	Y	Y	Total Employees with Green Commute / Total # Employees	Could be applied park-wide (e.g. % of park employees who drive automobiles and commute <5km . Shorter commutes directly affect emissions and employee productivity.	X	X	X
Commute Length	km	↓	Y	Y	Median (Individual Business Median Commute Lengths)	The mean length of employees' commutes to a given industrial area.	X	X	X
Average Distance to Alternative Fuel Service Station	km	↓	N	N	Average (Dstances of Individual Businesses to Nearest Alternative Fuel Service Station)	Presence of alternative re-fueling station(s) in the industrial park/area or nearby.			X
Access to Public Transit	# / # (%)	↑	N	N	Total # Businesses Walking Distance to Public Transit / Total # Businesses	Businesses located within easy walking distance of a public transit stop.		X	X
Access to Key Services	# / # (%)	↑	N	N	Total # Businesses Walking Distance to	Businesses located within easy walking distance of key services. There is a rough correlation to support for mixed-use development, an objective of EIN and sustainable community planning.	X	X	X

Table 3: Proposed Sustainable Industries Performance Indicators Framework, *continued*

Performance Indicator	Units (Annual Basis)	Direction of Progress	Median Across Site Useful?	Useful for Individual Business?	Calculation	What the Indicator Tells You	Sustainability Components		
					Key Services / Total # Businesses				
Access to Green Space & Trails	# / # (%)	↑	N	N	Total # Businesses Walking Distance to Green Space & Trails / Total # Businesses	Businesses located within easy walking distance of connected greenspace affects employees' ability go for walks in natural spaces during lunchbreaks etc. This can directly impact employee productivity.	X	X	X
Corporate & Municipal Governance									
Supportive Municipal Policy Framework	List of all relevant policies	-	N	N	-	Qualification - review of docs to find support for EIN and Susainable Industry. In particular, land use / infrastructure plans or strategies should explicitly address EIN and/or sustainable activity in industrial areas. The presence or absence of supportive policies will affect the level and number of progressive (eco-industrial) strategies that can be pursued in an industrial park.	X	X	X
Supportive Municipal Objectives	List of all relevant objectives / targets	-	N	N	-	Measure of the extent to which the above policies are actually being implemented.	X	X	X
Supportive Corporate Policy Framework	# / # (%)	↑	N	N	Total # of Businesses with Supportive Corporate Policies / Total # Businesses	How many businesses have executive level support for EIN and making progress towards sustainability.	X	X	X

Table 3: Proposed Sustainable Industries Performance Indicators Framework, *continued*

Performance Indicator	Units (Annual Basis)	Direction of Progress	Median Across Site Useful?	Useful for Individual Business?	Calculation	What the Indicator Tells You	Sustainability Components		
Supportive Corporate Objectives	# / # (%)	↑	N	N	# of Businesses with Supportive Corporate Objectives / Total # Businesses	Measure of the extent to which the above corporate policies are actually being implemented. Even more than policies, having actual objecitves and targets in place indicates that businesses at the site are striving to move towards sustainability.	X	X	X
Site-Wide EIN / Sustainability Initiaitve	Y / N	-	N	N	-	Whether or not a formal, multi-business program is in place to support EIN / sustainable industry across the site.	X	X	X
Active Municipal Participation	Y / N	-	-	-	-	Whether or not the municipality supports the above initiaitve(s)	X	X	X
Site-Wide Corporate Participation in Sustainability	# / # (%)	↑	N	N	Total # Businesses Returning Surveys / Total # Businesses	How widely across the site the formail EIN initiative has support. Successful EIN depends on strong and varied relationships among businesses.	X	X	X
Environment / Sustainability Reporting	# / # (%)	↑	N	N	Total # Sustainability Reports / Total # Businesses	How formalized and entrenched in management sustainability is among businesses in the site. There is a general correlation between progressive management and support for EIN (and EIN should re-inforce the need for businesses to rigourously track programs and results)	X	X	X
Corporate Certification	# / # (%)	↑	N	N	Total # Certified Businesses / Total # Businesses	Prevalence of formally certified businesses, usually relates to progressive management.	X	X	X
Local Supply Web	# / # (%)	↑	N	N	Total # Local Supply Chain Members / Total #	How well businesses are contributing to and integrated with the local economy. The EIN analogy is a food web - the more local supplier and customer links, the stronger the industrial ecosystem.	X	X	X

Table 3: Proposed Sustainable Industries Performance Indicators Framework, *continued*

Performance Indicator	Units (Annual Basis)	Direction of Progress	Median Across Site Useful?	Useful for Individual Business?	Calculation	What the Indicator Tells You	Sustainability Components		
					Businesses				
Green Procurement Practice	# / # (%)	↑	N	N	Total # Businesses with Green Procurement Policy / Total # Businesses	How widespread support for green procurement is. Because green procurement practices often emphasize the use of more environmentally-friendly and locally available products, there is a potential relationship between green procurement and other strategies such as by-product utilization.	X	X	X
Eco-Industrial Networking-Specific									
Green Buildings	m2 / m2	↑	Y	Y	Total Green Building Area / Total Building Area	How well buildings on the site have reduced their operating costs and environmental impact.	X		X
Light Pollution Reduction	# / # (%)	↓	N	N	Total # Light Pollution Strategies / Total # Businesses	Number of businesses within the site that have implemented light pollution reduction strategies/technologies.	X	X	X
Business Sector Diversity	#	↑	N	N	# of sectors counted from Business Lists	To reflect the number and sizes of different sectors within a park (higher number improves resilience of the "industrial ecosystem" and often leads to more material and energy synergies).	X	X	X
Business Service Networking	# / # (%)	↑	N	N	Total # Businesses Sharing Services / Total # Businesses	How well EIN around services is established.	X	X	
Facilities Networking	# / # (%)	↑	N	N	Total # Businesses Sharing	Could be adapted to industrial parks/areas as the number of multiple use facilities.	X	X	

Table 3: Proposed Sustainable Industries Performance Indicators Framework, *continued*

Performance Indicator	Units (Annual Basis)	Direction of Progress	Median Across Site Useful?	Useful for Individual Business?	Calculation	What the Indicator Tells You	Sustainability Components		
					Facilities / Total # Businesses				
Materials Networking	# / # (%)	↑	N	N	Total # Businesses Receiving Raw Materials or Delivering Product On Site / Total # Businesses	Number of partnerships where another local company purchases reusable materials from a business within the industrial park / area. (or business in park purchases materials from local company)	X		X
By-Product Networking	# / # (%)	↑	N	N	Total # Businesses Receiving By-Product From On Site / Total # Businesses	Number of partnerships where another local company purchases reusable materials from a business within the industrial park / area. (or business in park purchases materials from local company)	X		X
Energy Networking	# / # (%)	↑	N	N	Total # Businesses Consuming Energy from On-Site / Total # Businesses	Number of partnerships where another local company purchases reusable materials from a business within the industrial park / area. (or business in park purchases materials from local company)	X		X
Recycling-Based Businesses	# / # (%)	↑	N	N	Total # Recycling Businesses / Total # Businesses	How well established "scavengers and decomposers" are. Recycling, repair, remanufacture, reprocessing, resale, and rental	X	X	X
Site-wide Communications Initiatives	Y / N	-	N	N	-	How well businesses are communicating with each other.	X	X	

Table 3: Proposed Sustainable Industries Performance Indicators Framework, *continued*

Performance Indicator	Units (Annual Basis)	Direction of Progress	Median Across Site Useful?	Useful for Individual Business?	Calculation	What the Indicator Tells You	Sustainability Components		
Community									
Participation in Community Donations	# / # (%)	↑	N	N	Total # Businesses Making Donations / Total # Businesses	How well the businesses are linked to their communities.		X	
Community Donations - Financial	$ / $ (%)	↑	Y	Y	Total $ Donated to Community / Total Gross Revenues	How much money businesses give directly back to community organizations.		X	
Community Donations - Non-Financial	hr / #	↑	Y	Y	Total # Volunteer Hours / Total # Employees	Businesses within an industrial park/area participating in community initiatives, events, by offering more than financial sponsorship (e.g. employees allowed to volunteer 1d/month).		X	
Security	# / # (%)	↓	N	N	Total # of Break-Ins / Total # Businesses	Security has been ideintified as a major concern in many sites. EIN encourages netwokring around all kinds of issues, including security. Sustainable industries should be practicing Crime Prevention Through Environmental Design (CPTED).	X	X	
Odour Complaints	# / # (%)	↓	N	N	Total # Odour Complaints / Total # Businesses	The number of complaints about odours from an industrial park/area from surrounding residential/commercial communities. One caveat is that sites near more dense residential development may score relatively more poorly than other sites. However, especially taken in the context of other indicators, this is a useful comparison.		X	X

To facilitate the calculation of performance indicators, there is also a checklist listing the information needed per indicator so that participants can see at a glance which indicators they will be able to calculate, and where remaining data gaps are. This checklist is shown in Table 4 below.

Table 4: Getting Started Matrix: Information Needs and Related Indicators

Information Category	Checklist (check when data is collected)	Information Type	Performance Indicator: Employee Productivity	Productivity	Economic Generation	Jobs Density	Natural Habitat Density	Open Space Density	Median Distance to Neighbouring Business	Road Density	Pedestrian & Bicycle Friendliness	Bicycle Facilities	Parking Intensity	Green Commuters	Commute Length	Average Distance to Alternative Fuel Service Station	Access to Public Transit	Access to Key Services	Access to Green Space & Trails
			Overall Production/Financial				Land Use & Transportation Infrastructure												
Overall Production / Financial		Total Gross Revenues Generated	✓	✓	✓														
		Total Employees	✓			✓					✓		✓	✓					
		Total # Businesses										✓					✓	✓	✓
Energy		Total Energy Consumed																	
		Total Building Energy Consumed																	
		Total Green Energy Consumed																	
		Total Energy Generated																	
		Total Energy Losses																	
		Total Green Energy Generated																	
		Total GHG Emissions																	
		Total # Businesses Reducing Energy																	
		Total Transportation Energy Consumed																	
		Total Green Transportation Energy Consumed																	
Materials		Total Products		✓															
		Total Non-Products (By-Products & Waste)																	
		Total By-Products																	
		Total Waste Generated																	
		Total Ozone Depleting Substance (ODS) Emissions Generated																	
		Total eSO2 Generated																	
		Total Raw Materials Consumed																	
		Total Material Inputs Consumed																	
		Total # Businesses Reducing Materials Consumption																	
Water (Potable, Non-Potable, Storm, Waste)		Total Water Consumed																	
		Total Potable Water Consumed																	
		Total Non-Potable Water Consumed																	
		Total Stormwater Consumed																	
		Total Wastewater Generated																	
		Total Water & Sewer Line																	
		Total # Businesses Reducing Water Consumption																	
Land Use and Transportation Infrastructure		Total Site Size			✓	✓	✓												
		Total Building Area																	
		Total Impervious Area																	
		Total Parking Area											✓						
		Total Greenspace						✓											
		Total Natural Area					✓												
		Total # Fleet Vehicles																	
		Total # Alternative Fleet Vehicles																	
		Total # Bicycle Facilities										✓							
		Total Road Right-of-Way								✓									
		Total Non-Vehicle Right-of-Way						✓			✓								
		Total Employees with Green Commute												✓					
		Individual Business Median Commute Length													✓				
		Distances between centres of main operations on abutting properties (median)							✓										
		Distances to Alternative Fuel Service Stations														✓			
		Total # Businesses Walking Distance to Public Transit															✓		
		Total # Businesses Walking Distance to Key Services																✓	
		Total # Businesses Walking Distance to Green Space																	✓
Corporation and Municipal Governance		Municipal Plans (Community / Development; Transportation; Stormwater Management; Energy; Air Quality Management; Liquid Waste Management; Solid Waste Management; etc)																	
		Corporate Reports (Annual, Sustainability, Corporate Social Responsibility, Environment)																	
		Committee / Project Reports for Site-Wide EIN or Sustainable Industry Initiatives																	
		Total # Sustainability Reports																	
		Total # Businesses with Supportive Corporate Policies																	
		Total # Businesses Returning Surveys																	
		Total # Businesses with Supportive Corporate Objectives																	
		Total # Certified Businesses																	
		Total # Local Supply Chain Members																	
Eco-Industrial Networking-Specific		List of Business By Sector		✓															
		Total Green Building Area																	
		Total # Businesses Sharing Services (with other businesses on-site)																	
		Total # Businesses Sharing Facilities (with other businesses on-site)																	
		Total # Businesses Receiving Raw Materials or Shipping Product on Site (from one business to another on-site)																	
		Total # Businesses Receiving By-Products On Site (from another businesses on-site)																	
		Total # Businesses Receiving Energy On Site (from another businesses on-site)																	
		Total # Recycling Based Businesses																	
		Total # Businesses with Green Procurement Policies																	
Community		Total # Businesses Making Community Donations																	
		Total $ Donated to Community																	
		Total # Volunteer Hours																	
		Total # Break-Ins																	
		Total # Odour Complaints																	
		Total # Light Pollution Strategies																	

* Assume Annual Basis where appropriate

Table 4: Getting Started Matrix: Information Needs and Related Indicators, *cont'd*

Information Category	Checklist (check when data is collected)	Information Type	Performance Indicators: Energy — Energy Intensity - Economic	Energy Intensity - Spatial	Energy Intensity - Production	GHG Emission Intensity	Energy Efficiency	Energy Reduction Participation	Green Energy Intensity - Production	Energy Self-Sufficiency	Green Energy Mix	Green Energy Self-Sufficiency	Building Energy Efficiency	Transportation Fuel Efficiency	Green Transportation Energy Mix	Alternative Fueled Fleets
Overall Production / Financial		Total Gross Revenues Generated	✓													
		Total Employees														
		Total # Businesses						✓								
Energy		Total Energy Consumed	✓	✓	✓		✓			✓	✓	✓				
		Total Building Energy Consumed											✓			
		Total Green Energy Consumed							✓		✓	✓				
		Total Energy Generated								✓						
		Total Energy Losses					✓									
		Total Green Energy Generated										✓				
		Total GHG Emissions				✓										
		Total # Businesses Reducing Energy						✓								
		Total Transportation Energy Consumed												✓	✓	
		Total Green Transportation Energy Consumed													✓	
Materials		Total Products			✓	✓			✓							
		Total Non-Products (By-Products & Waste)														
		Total By-Products														
		Total Waste Generated														
		Total Ozone Depleting Substance (ODS) Emissions Generated														
		Total eSO2 Generated														
		Total Raw Materials Consumed														
		Total Material Inputs Consumed														
		Total # Businesses Reducing Materials Consumption														
Water (Potable, Non-Potable, Storm, Waste)		Total Water Consumed														
		Total Potable Water Consumed														
		Total Non-Potable Water Consumed														
		Total Stormwater Consumed														
		Total Wastewater Generated														
		Total Water & Sewer Line														
		Total # Businesses Reducing Water Consumption														
Land Use and Transportation Infrastructure		Total Site Size		✓												
		Total Building Area											✓			
		Total Impervious Area														
		Total Parking Area														
		Total Greenspace														
		Total Natural Area														
		Total # Fleet Vehicles												✓		✓
		Total # Alternative Fleet Vehicles														✓
		Total # Bicycle Facilities														
		Total Road Right-of-Way														
		Total Non-Vehicle Right-of-Way														
		Total Employees with Green Commute														
		Individual Business Median Commute Length														
		Distances between centres of main operations on abutting properties (median)														
		Distances to Alternative Fuel Service Stations														
		Total # Businesses Walking Distance to Public Transit														
		Total # Businesses Walking Distance to Key Services														
		Total # Businesses Walking Distance to Green Space														
Corporation and Municipal Governance		Municipal Plans (Community / Development; Transportation; Stormwater Management; Energy; Air Quality Management; Liquid Waste Management; Solid Waste Management; etc)														
		Corporate Reports (Annual, Sustainability, Corporate Social Responsibility, Environment)														
		Committee / Project Reports for Site-Wide EIN or Sustainable Industry Initiatives														
		Total # Sustainability Reports														
		Total # Businesses with Supportive Corporate Policies														
		Total # Businesses Returning Surveys														
		Total # Businesses with Supportive Corporate Objectives														
		Total # Certified Businesses														
		Total # Local Supply Chain Members														
Eco-Industrial Networking-Specific		List of Business By Sector														
		Total Green Building Area														
		Total # Businesses Sharing Services (with other businesses on-site)														
		Total # Businesses Sharing Facilities (with other businesses on-site)														
		Total # Businesses Receiving Raw Materials or Shipping Product on Site (from one business to another on-site)														
		Total # Businesses Receiving By-Products On Site (from another businesses on-site)														
		Total # Businesses Receiving Energy On Site (from another businesses on-site)														
		Total # Recycling Based Businesses														
		Total # Businesses with Green Procurement Policies														
Community		Total # Businesses Making Community Donations														
		Total $ Donated to Community														
		Total # Volunteer Hours														
		Total # Break-Ins														
		Total # Odour Complaints														
		Total # Light Pollution Strategies														

* Assume Annual Basis where appropriate

Table 4: Getting Started Matrix: Information Needs and Related Indicators, *cont'd*

Information Category	Checklist (check when data is collected)	Information Type	Performance Indicators: Water (Potable, Non-Potable, Storm, Waste) — Sewer / Water Infrastructure Intensity	Impervious Surface Intensity	Water Use Intensity	Water Reduction Participation	Stormwater Utilization	Potable Water Utilization	Non-Potable Water Utilization	Wastewater Discharge Intensity	Performance Indicators: Materials — Product to Non-Product Ratio	Materials Efficncy - Total	Materials Efficncy - Raw Materials	Waste Disposal	By-Product Utilization	Materials Reduction Participation	ODS Emission Intensity	Acidification Emission Intensity
Overall Production / Financial		Total Gross Revenues Generated																
		Total Employees																
		Total # Businesses				✓										✓		
Energy		Total Energy Consumed																
		Total Building Energy Consumed																
		Total Green Energy Consumed																
		Total Energy Generated																
		Total Energy Losses																
		Total Green Energy Generated																
		Total GHG Emissions																
		Total # Businesses Reducing Energy																
		Total Transportation Energy Consumed																
		Total Green Transportation Energy Consumed																
Materials		Total Products			✓					✓	✓	✓	✓				✓	✓
		Total Non-Products (By-Products & Waste)									✓			✓	✓			
		Total By-Products													✓			
		Total Waste Generated												✓				
		Total Ozone Depleting Substance (ODS) Emissions Generated															✓	
		Total eSO2 Generated																✓
		Total Raw Materials Consumed											✓					
		Total Material Inputs Consumed										✓						
		Total # Businesses Reducing Materials Consumption														✓		
Water (Potable, Non-Potable, Storm, Waste)		Total Water Consumed			✓		✓	✓	✓									
		Total Potable Water Consumed						✓										
		Total Non-Potable Water Consumed							✓									
		Total Stormwater Consumed					✓											
		Total Wastewater Generated								✓								
		Total Water & Sewer Line	✓															
		Total # Businesses Reducing Water Consumption				✓												
Land Use and Transportation Infrastructure		Total Site Size	✓	✓														
		Total Building Area																
		Total Impervious Area		✓														
		Total Parking Area																
		Total Greenspace																
		Total Natural Area																
		Total # Fleet Vehicles																
		Total # Alternative Fleet Vehicles																
		Total # Bicycle Facilities																
		Total Road Right-of-Way																
		Total Non-Vehicle Right-of-Way																
		Total Employees with Green Commute																
		Individual Business Median Commute Length																
		Distances between centres of main operations on abutting properties (median)																
		Distances to Alternative Fuel Service Stations																
		Total # Businesses Walking Distance to Public Transit																
		Total # Businesses Walking Distance to Key Services																
		Total # Businesses Walking Distance to Green Space																
Corporation and Municipal Governance		Municipal Plans (Community / Development; Transportation; Stormwater Management; Energy; Air Quality Management; Liquid Waste Management; Solid Waste Management; etc)																
		Corporate Reports (Annual, Sustainability, Corporate Social Responsibility, Environment)																
		Committee / Project Reports for Site-Wide EIN or Sustainable Industry Initiatives																
		Total # Sustainability Reports																
		Total # Businesses with Supportive Corporate Policies																
		Total # Businesses Returning Surveys																
		Total # Businesses with Supportive Corporate Objectives																
		Total # Certified Businesses																
		Total # Local Supply Chain Members																
Eco-Industrial Networking-Specific		List of Business By Sector																
		Total Green Building Area																
		Total # Businesses Sharing Services (with other businesses on-site)																
		Total # Businesses Sharing Facilities (with other businesses on-site)																
		Total # Businesses Receiving Raw Materials or Shipping Product on Site (from one business to another on-site)																
		Total # Businesses Receiving By-Products On Site (from another businesses on-site)																
		Total # Businesses Receiving Energy On Site (from another businesses on-site)																
		Total # Recycling Based Businesses																
		Total # Businesses with Green Procurement Policies																
Community		Total # Businesses Making Community Donations																
		Total $ Donated to Community																
		Total # Volunteer Hours																
		Total # Break-Ins																
		Total # Odour Complaints																
		Total # Light Pollution Strategies																

* Assume Annual Basis where appropriate

Table 4: Getting Started Matrix: Information Needs and Related Indicators, *cont'd*

Information Category	Checklist (check when data is collected)	Information Type	Performance Indicators: Corporate & Municipal Governance — Supportive Municipal Policy Framework	Supportive Municipal Objectives	Supportive Corporate Policy Framework	Supportive Corporate Objectives	Site-Wide EIN / Sustainability Initiative	Active Municipal Participation	Site-Wide Corporate Participation in Sustainability	Environment / Sustainability Reporting	Corporate Certification	Local Supply Web	Green Procurement Practice
Overall Production / Financial		Total Gross Revenues Generated											
		Total Employees											
		Total # Businesses			✓	✓			✓	✓	✓	✓	✓
Energy		Total Energy Consumed											
		Total Building Energy Consumed											
		Total Green Energy Consumed											
		Total Energy Generated											
		Total Energy Losses											
		Total Green Energy Generated											
		Total GHG Emissions											
		Total # Businesses Reducing Energy											
		Total Transportation Energy Consumed											
		Total Green Transportation Energy Consumed											
Materials		Total Products											
		Total Non-Products (By-Products & Waste)											
		Total By-Products											
		Total Waste Generated											
		Total Ozone Depleting Substance (ODS) Emissions Generated											
		Total eSO2 Generated											
		Total Raw Materials Consumed											
		Total Material Inputs Consumed											
		Total # Businesses Reducing Materials Consumption											
Water (Potable, Non-Potable, Storm, Waste)		Total Water Consumed											
		Total Potable Water Consumed											
		Total Non-Potable Water Consumed											
		Total Stormwater Consumed											
		Total Wastewater Generated											
		Total Water & Sewer Line											
		Total # Businesses Reducing Water Consumption											
Land Use and Transportation Infrastucture		Total Site Size											
		Total Building Area											
		Total Impervious Area											
		Total Parking Area											
		Total Greenspace											
		Total Natural Area											
		Total # Fleet Vehicles											
		Total # Alternative Fleet Vehicles											
		Total # Bicycle Facilities											
		Total Road Right-of-Way											
		Total Non-Vehicle Right-of-Way											
		Total Employees with Green Commute											
		Individual Business Median Commute Length											
		Distances between centres of main operations on abutting properties (median)											
		Distances to Alternative Fuel Service Stations											
		Total # Businesses Walking Distance to Public Transit											
		Total # Businesses Walking Distance to Key Services											
		Total # Businesses Walking Distance to Green Space											
Corporation and Municipal Governance		Municipal Plans (Community / Development; Transportation; Stormwater Management; Energy; Air Quality Management; Liquid Waste Management; Solid Waste Management; etc)	✓	✓									
		Corporate Reports (Annual, Sustainability, Corporate Social Responsibility, Environment)			✓	✓							
		Committee / Project Reports for Site-Wide EIN or Sustainable Industry Initiatives					✓		✓				
		Total # Sustainability Reports								✓			
		Total # Businesses with Supportive Corporate Policies			✓								
		Total # Businesses Returning Surveys							✓				
		Total # Businesses with Supportive Corporate Objectives				✓							
		Total # Certified Businesses									✓		
		Total # Local Supply Chain Members										✓	
Eco-Industrial Networking-Specific		List of Business By Sector											
		Total Green Building Area											
		Total # Businesses Sharing Services (with other businesses on-site)											
		Total # Businesses Sharing Facilities (with other businesses on-site)											
		Total # Businesses Receiving Raw Materials or Shipping Product on Site (from one business to another on-site)											
		Total # Businesses Receiving By-Products On Site (from another businesses on-site)											
		Total # Businesses Receiving Energy On Site (from another businesses on-site)											
		Total # Recycling Based Businesses											
		Total # Businesses with Green Procurement Policies											✓
Community		Total # Businesses Making Community Donations											
		Total $ Donated to Community											
		Total # Volunteer Hours											
		Total # Break-Ins											
		Total # Odour Complaints											
		Total # Light Pollution Strategies											

* Assume Annual Basis where appropriate

Table 4: Getting Started Matrix: Information Needs and Related Indicators, *cont'd*

Information Category	Checklist (check when data is collected)	Information Type	Performance Indicators: Water (Potable, Non-Potable, Storm, Waste) — Sewer / Water Infrastructure Intensity	Impervious Surface Intensity	Water Use Intensity	Water Reduction Participation	Stormwater Utilization	Potable Water Utilization	Non-Potable Water Utilization	Wastewater Discharge Intensity	Performance Indicators: Materials — Product to Non-Product Ratio	Materials Efficency - Total	Materials Efficency - Raw Materials	Waste Disposal	By-Product Utilization	Materials Reduction Participation	ODS Emission Intensity	Acidification Emission Intensity
Overall Production / Financial		Total Gross Revenues Generated																
		Total Employees																
		Total # Businesses				✓										✓		
Energy		Total Energy Consumed																
		Total Building Energy Consumed																
		Total Green Energy Consumed																
		Total Energy Generated																
		Total Energy Losses																
		Total Green Energy Generated																
		Total GHG Emissions																
		Total # Businesses Reducing Energy																
		Total Transportation Energy Consumed																
		Total Green Transportation Energy Consumed																
Materials		Total Products			✓					✓	✓	✓	✓				✓	✓
		Total Non-Products (By-Products & Waste)									✓			✓	✓			
		Total By-Products													✓			
		Total Waste Generated												✓				
		Total Ozone Depleting Substance (ODS) Emissions Generated															✓	
		Total eSO2 Generated																✓
		Total Raw Materials Consumed											✓					
		Total Material Inputs Consumed										✓						
		Total # Businesses Reducing Materials Consumption														✓		
Water (Potable, Non-Potable, Storm, Waste)		Total Water Consumed			✓		✓	✓	✓									
		Total Potable Water Consumed						✓										
		Total Non-Potable Water Consumed							✓									
		Total Stormwater Consumed					✓											
		Total Wastewater Generated								✓								
		Total Water & Sewer Line	✓															
		Total # Businesses Reducing Water Consumption				✓												
Land Use and Transportation Infrastructure		Total Site Size	✓	✓														
		Total Building Area																
		Total Impervious Area		✓														
		Total Parking Area																
		Total Greenspace																
		Total Natural Area																
		Total # Fleet Vehicles																
		Total # Alternative Fleet Vehicles																
		Total # Bicycle Facilities																
		Total Road Right-of-Way																
		Total Non-Vehicle Right-of-Way																
		Total Employees with Green Commute																
		Individual Business Median Commute Length																
		Distances between centres of main operations on abutting properties (median)																
		Distances to Alternative Fuel Service Stations																
		Total # Businesses Walking Distance to Public Transit																
		Total # Businesses Walking Distance to Key Services																
		Total # Businesses Walking Distance to Green Space																
Corporation and Municipal Governance		Municipal Plans (Community / Development; Transportation; Stormwater Management; Energy; Air Quality Management; Liquid Waste Management; Solid Waste Management; etc)																
		Corporate Reports (Annual, Sustainability, Corporate Social Responsibility, Environment)																
		Committee / Project Reports for Site-Wide EIN or Sustainable Industry Initiatives																
		Total # Sustainability Reports																
		Total # Businesses with Supportive Corporate Policies																
		Total # Businesses Returning Surveys																
		Total # Businesses with Supportive Corporate Objectives																
		Total # Certified Businesses																
		Total # Local Supply Chain Members																
Eco-Industrial Networking-Specific		List of Business By Sector																
		Total Green Building Area																
		Total # Businesses Sharing Services (with other businesses on-site)																
		Total # Businesses Sharing Facilities (with other businesses on-site)																
		Total # Businesses Receiving Raw Materials or Shipping Product on Site (from one business to another on-site)																
		Total # Businesses Receiving By-Products On Site (from another businesses on-site)																
		Total # Businesses Receiving Energy On Site (from another businesses on-site)																
		Total # Recycling Based Businesses																
		Total # Businesses with Green Procurement Policies																
Community		Total # Businesses Making Community Donations																
		Total $ Donated to Community																
		Total # Volunteer Hours																
		Total # Break-Ins																
		Total # Odour Complaints																
		Total # Light Pollution Strategies																

* Assume Annual Basis where appropriate

Table 4: Getting Started Matrix: Information Needs and Related Indicators, *cont'd*

Information Category	Checklist (check when data is collected)	Information Type	Performance Indicators: Green Buildings	Light Pollution Reduction	Business Sector Diversity	Business Service Networking	Facilities Networking	Materials Networking	By-Product Networking	Energy Networking	Recycling-Based Businesses	Site-wide Communications Initiatives	Participation in Community Donations	Community Donations - Financial	Community Donations - Non-Financial	Security	Odour Complaints
			Eco-Industrial Networking-Specific										Community				
Overall Production / Financial		Total Gross Revenues Generated												✓			
		Total Employees													✓		
		Total # Businesses		✓		✓	✓	✓	✓	✓	✓		✓			✓	✓
Energy		Total Energy Consumed															
		Total Building Energy Consumed															
		Total Green Energy Consumed															
		Total Energy Generated															
		Total Energy Losses															
		Total Green Energy Generated															
		Total GHG Emissions															
		Total # Businesses Reducing Energy															
		Total Transportation Energy Consumed															
		Total Green Transportation Energy Consumed															
Materials		Total Products															
		Total Non-Products (By-Products & Waste)															
		Total By-Products															
		Total Waste Generated															
		Total Ozone Depleting Substance (ODS) Emissions Generated															
		Total eSO2 Generated															
		Total Raw Materials Consumed															
		Total Material Inputs Consumed															
		Total # Businesses Reducing Materials Consumption															
Water (Potable, Non-Potable, Storm, Waste)		Total Water Consumed															
		Total Potable Water Consumed															
		Total Non-Potable Water Consumed															
		Total Stormwater Consumed															
		Total Wastewater Generated															
		Total Water & Sewer Line															
		Total # Businesses Reducing Water Consumption															
Land Use and Transportation Infrastructure		Total Site Size															
		Total Building Area	✓														
		Total Impervious Area															
		Total Parking Area															
		Total Greenspace															
		Total Natural Area															
		Total # Fleet Vehicles															
		Total # Alternative Fleet Vehicles															
		Total # Bicycle Facilities															
		Total Road Right-of-Way															
		Total Non-Vehicle Right-of-Way															
		Total Employees with Green Commute															
		Individual Business Median Commute Length															
		Distances between centres of main operations on abutting properties (median)															
		Distances to Alternative Fuel Service Stations															
		Total # Businesses Walking Distance to Public Transit															
		Total # Businesses Walking Distance to Key Services															
		Total # Businesses Walking Distance to Green Space															
Corporation and Municipal Governance		Municipal Plans (Community / Development; Transportation; Stormwater Management; Energy; Air Quality Management; Liquid Waste Management; Solid Waste Management; etc)															
		Corporate Reports (Annual, Sustainability, Corporate Social Responsibility, Environment)															
		Committee / Project Reports for Site-Wide EIN or Sustainable Industry Initiatives															
		Total # Sustainability Reports															
		Total # Businesses with Supportive Corporate Policies															
		Total # Businesses Returning Surveys															
		Total # Businesses with Supportive Corporate Objectives															
		Total # Certified Businesses															
		Total # Local Supply Chain Members															
Eco-Industrial Networking-Specific		List of Business By Sector			✓												
		Total Green Building Area	✓														
		Total # Businesses Sharing Services (with other businesses on-site)				✓											
		Total # Businesses Sharing Facilities (with other businesses on-site)					✓										
		Total # Businesses Receiving Raw Materials or Shipping Product on Site (from one business to another on-site)						✓									
		Total # Businesses Receiving By-Products On Site (from another businesses on-site)							✓								
		Total # Businesses Receiving Energy On Site (from another businesses on-site)								✓							
		Total # Recycling Based Businesses									✓						
		Total # Businesses with Green Procurement Policies															
Community		Total # Businesses Making Community Donations											✓				
		Total $ Donated to Community												✓			
		Total # Volunteer Hours													✓		
		Total # Break-Ins														✓	
		Total # Odour Complaints															✓
		Total # Light Pollution Strategies		✓													

* Assume Annual Basis where appropriate

3.3 BENEFITS OF SUSTAINABLE INDUSTRIES PERFORMANCE INDICATORS

Better, More Informed Decision Making: The sustainable industries performance indicators should better demonstrate the direct link between environmental and social performance and the fiscal bottom line. This will provide businesses with the information they need to make decisions e.g., to prioritize energy initiatives on transportation energy versus building energy. By allowing site-to-site benchmarking, businesses will be able to evaluate sustainability initiatives in place elsewhere, and determine what the potential impact of those initiatives will be for their site. The result will be a better informed decision-making process.

Increased Support for Sustainability: The indicators will bring rigorous and consistent reporting to eco-industrial and related projects. Many in the business community, and even in municipal government circles, still perceive sustainability as a cost-added, rather than a value-added, proposition. This is largely due to poor performance measurement systems, limiting business and community's ability to learn from the success and failure of other projects. This perception creates large hurdles for the sustainability field to overcome and puts the credibility of sustainability and eco-industrial approaches at risk. By enhancing the rigour with which environmental/social/economic performance of businesses (and more importantly, the interactions between them) is measured, the economic, social, and environmental benefits will be quantitatively demonstrated.

Increased Access to Funding for Projects: Before businesses, municipal governments, and external funding programs commit funding towards sustainability initiatives, they rightly require projections regarding measurable results. The sustainable industries performance indicators will help to provide a rigorous and credible backbone for projects. This should enable project supporters to better leverage support and/or funds.

Better Understanding of Overall Progress: It is important to remember that a single indicator cannot describe the "big picture" with respect to a site's progress towards sustainability. For example, while increasing the Green Energy Mix is desirable, if this occurs at the same time as an increase in Energy Intensity, then the overall progress is diminished. Although the differences between the indicators may appear subtle, the full set is needed to truly measure progress.

3.4 POTENTIAL CHALLENGES WITH SUSTAINABLE INDUSTRIES PERFORMANCE INDICATORS

Access to Data from Utilities: As shown in Table 2, utility companies can be a good source of much energy-related information. However, in areas not serviced by natural gas, collecting this data could become cumbersome since so many companies may be involved in supplying several types of fuel (e.g., hog fuel, diesel, Bunker C). For these sites, business participation will almost certainly be required to collect the needed energy data.

Access to Data from Businesses: Business participation in EIN projects tends to grow over time. Therefore, it may be more difficult to access data from businesses early on in projects, even if only a survey response is required. The solution is a combination of early and sustained stakeholder engagement and capacity building (e.g. site visits, workshops, focus groups) in order to build the understanding that EIN does not have to be a "new venture" that requires additional resources to be successful. Once you have a small group of businesses that are keen to participate (e.g. forming an EIN business advisory

committee), it becomes easier to leverage further support and participation from other businesses in the site. The performance indicators themselves should help to increase business participation. Measurable results year to year should help to convince businesses of the benefits from participation.

Balancing Confidentiality and Data Needs: Confidentiality is always a concern for the business community. Many businesses will not want data specific to their operations published. Therefore, business concerns regarding confidentiality could result in limited access to data. It is important to note that ALL of the sustainable industries performance indicators refer to aggregate or mean data. Data specific to any one business will not be made available. Where individual business data is required e.g., total gross revenues, confidentiality agreements can be put in place assuring individual businesses that their data will only be used to calculate the performance indicators and will not be published or otherwise made available to other businesses or the public.

4 NEXT STEPS

4.1 PILOT THE FRAMEWORK & REFINE INDICATORS

The next step in the development of the sustainable performance industries indicators would be to pilot the indicators at one site. The objective of the pilot will be to apply the framework and calculate a baseline at one or more pilot sites. This will help to confirm that the data required is indeed available, and that businesses and local governments support the framework.

It would be most efficient to select a pilot site where businesses and the municipal government are already engaged in an EIN or other multi-stakeholder sustainability initiative. Existing eco-industrial park projects (e.g. Ross Industrial Park, Hinton Eco-Industrial Park, Tilbury Industrial Area, or Burnside Industrial Park) would be good pilot sites because they are already completing material and energy baselines, and the local businesses and municipalities have committed to participating (e.g. making data available). This step will help to determine if the indicators make sense from an operational standpoint.

Piloting the framework should involve consultation with site business owners and stakeholders, municipal representatives and other community groups (e.g. academia). Indicators that are too difficult to monitor should be removed and the remaining indicators should be prioritized based on industry acceptance or ease of calculation.

A pilot project will help practitioners to identify potential methodological and data gathering problems, and to refine the framework accordingly. It will also highlight gaps in the framework that may require additional indicators.

As discussed earlier, there are many performance indicators that are useful for an individual site. The pilot project could also help to document these and support future development of a list of site-specific performance indicators to help businesses track their own internal perforamce.

4.2 BENCHMARK CANADIAN INDUSTRIAL AREAS

Once the performance indicator framework has been piloted and refined, then the next step would be to determine baselines for a number of representative Canadian industrial areas. This would create a resource that would allow sites to benchmark their performance and to set realistic targets. For example, even if one site does determine its Energy Intensity,

there is currently no way to determine whether this is better or worse than the Energy Intensity at any other site. This has been a key challenge for EIN project. For example, the proponents of the Maplewood Project intuitively know that the plans put forward by the design charrette teams are innovative, but there is no way of knowing whether implementing these plans will result in Maplewood "catching up" in some respects, will result in across the board leadership with respect to land use planning and operational practices in the industrial area.

A benchmarking project should also include an evaluation of sites that appear to be performing better than others to determine *why* they are performing better. This information could help other sites to develop action plans and targets to increase their progress towards sustainability.

4.3 ADOPT SUSTAINABLE INDUSTRIES PERFORMANCE INDICATORS

Industry and communities should be encouraged and supported to adopt the sustainable industries performance indicators framework. Eventually, the framework would be used to establish baselines, set targets, and continuously progress towards sustainable industries.

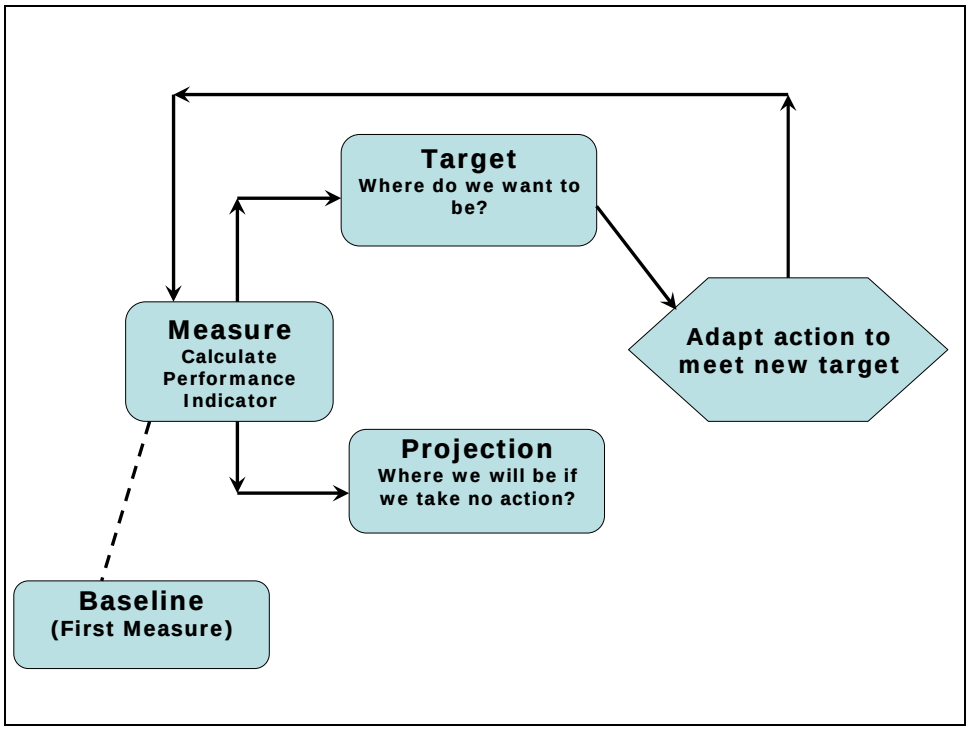

Figure 1: Use of Sustainable Industries Performance Indicators

Eventually, enough information could be available to support some sort of certification program.

APPENDIX A: INDICATORS LITERATURE REVIEW

TABLE A 1: INDICATORS LITERATURE REVIEW – GOVERNMENT DOCUMENTS

Indicator & Description (If Provided)			Units	Data Sources (if provided) / Comments
NRTEE Eco-Efficiency Indicators Workbook - indicators are measured as an environmental burden (i.e. use of resources) at the level of its project boundary / amount of product or service value produced by that section of the company. Core indicators followed by complimentary indicators.				
Core	Core Energy Intensity	Energy (electricity, gas, oil, coal, coke, and others) consumed within the project boundary from all sources / unit of production or service delivery. Energy generated on-site should be added to total energy.	MJ / [e.g. t, $, # of widgets, etc]	billing information; direct meter readings. (Ensure that data collected are applicable to specific reporting period)
Compli-mentary	Life-cycle energy intensity	The sum of the energy consumed during all of the phases of the product or service life-cycle, from the extraction and processing of input materials and energy through to the eventual disposal of the product (advice to limit calculation to include 1 life-cycle step upstream and 1 step downstream to ease calculations).	MJ (life-cycle step 1+ 2 + 3….life-cycle step n) / [e.g. t, $, # of widgets]	Direct metering; billing information (*number of upstream/downstream steps to be included in the life-cycle analysis must be clearly defined)
	Excess energy intensity	Excess energy generated within a products or service entity that is not used within the facility but is used by or sold to others. This indicator applies to companies that produce energy as a co-product. (MWh x 3600 MJ/MWh)	MJ / [e.g. t, $, # of widgets, etc]	Direct metering (at the pt where energy is produced, or at the pt where energy is used); invoicing information to purchasers of excess energy.
	Transportation energy intensity	Energy needed to transport materials and/or energy between life-cycle steps per unit of service (i.e. between project boundaries)	MJ / [e.g. t, $, # of widgets, etc]	HR timesheets; mileage forms. (*for transportation companies, this might be the core energy intensity indicator)
	Transportation energy intensity of personnel	Energy required to transport personnel to and from the project boundary as normal business practice.	MJ / [e.g. t, $, # of widgets, etc]	HR timesheets; mileage forms. Includes travel to/from project boundary as normal business practice, and travel to and from boundary on a daily basis.

TABLE A 1, continued

Indicator & Description (If Provided)			Units	Data Sources (if provided) / Comments
Core	Core Waste Intensity	The total material entering the product boundary minus material that ends up in the product and co-product per unit of production or service delivery. (can be calculated by materials in or waste output)	kg / [e.g. t, $, # of widgets, etc]	Mass balance approach: purchasing dept records for info on direct and indirect materials entering project boundary; Waste output approach: waste production records (e.g. trash bins, wastes sold or given to reusers/recyclers, discharges to air & water)
Compli-mentary	Waste utilization	The amount of reused waste as a percentage of total waste. (= [total wastes used (kg) / total wastes generated (kg)] x 100	% of wastes generated	Data for core waste intensity. Which of this waste is used in some way? (reclaimed by suppliers; recycled; sold/given away for other uses)
Core	Water Intensity	The amount of water taken into the project boundary per unit of product or service delivery	m^3 / [e.g. t, $, # of widgets, etc].	Metering data, billing records (Ensure that data collected are applicable to specific reporting period)
Compli-mentary	Water discharge intensity	Water discharged per unit of production (= total water discharged (m^3) / Unit of production or service delivery)	m^3 / [e.g. t, $, # of widgets, etc].	Water discharge points include discharges to water bodies, to groundwater, and to the municipal system
World Business Council for Sustainable Development: Measuring Eco-Efficiency. Defines eco-efficiency as product or service value / environmental influence. As such, provides a set of "generally applicable" Value indicators (VI) and Environmental Influence indicators (EII); and a set of "potentially generally applicable" value and environmental influence indicators.				
Generally Applicable VI	Quantity	Physical measure or count of product or services produced, delivered or sold to customers	Depends of business (e.g. number, volume, or mass)	Cost, production, or sales reports; Annual financial reports
	Net Sales	Net sales - total recorded sales less sales discounts and sales returns and allowances	Company's usual currency	Annual financial reports

TABLE A 1, continued

Indicator & Description (If Provided)			Units	Data Sources (if provided) / Comments
Generally Applicable EII	Energy Consumption	Total sum of energy consumed (equals energy purchases minus energy sold to others for their use), including: • electricity and district heat • fossil fuels (e.g. natural gas, oil, coal) • other fuel based energy (e.g. biomass, wood, waste fuel) • non-fuel based energy (e.g. solar, wind)	GJ (or other appropriate multiplier of joule)	Procurement files; Site energy/fuel use inventories; Facility management reports; Literature
	Material Consumption	Sum of weight of all materials purchased or obtained from other sources, including: • raw materials for conversion • other process materials (such as catalysts, solvents) • pre- or semi-manufactured goods and parts excluding packaging, water consumption and materials used for energy purposes	tonnes	Procurement files; Manufacturing reports; Cost reports
	Water Consumption	Sum of all fresh water purchased from public supply, or obtained from surface or ground water sources (including water for cooling purposes)	m^3	Procurement files; Manufacturing reports; Cost reports
	Ozone Depleting Substance (ODS) Emissions	Amount of ODS emissions to air from processes and losses/replacement from containments (chillers)	tonnes of CFC11 equivalents	Plant surveys; EHS reports; Estimation or calculation
	Greenhouse Gas Emissions (GHG)	Amount of GHG emissions to air from fuel combustion, process reactions and treatment processes, including CO_2, CH_4, N_20, HFCs, PFCs and SF_6 (excluding GHG emissions released in generation of purchased electricity)	tonnes $_eCO2$	Cost reports; Fuel invoices; Plant survey; EHS records; Estimation or calculation
Potentially Generally Applicable VI	Net Profit/Earnings/Income		in CDN, USD, Euro, Yen, or company's usual currency	Financial reports

TABLE A 1, continued

Indicator & Description (If Provided)			Units	Data Sources (if provided) / Comments
Potential Generally Applicable EII	Acidification Emissions to Air	Amount of acid gases and acid mists emitted to air (including NH_3, HCl, HF, NO_2, SO_2 and sulfuric acid mists) from fuel combustion, process reactions and treatment processes.	Acidification Emissions to Air	tonnes $_eSO_2$
	Total Waste	Total amount of substances or objects destined for disposal	tonnes	Plant surveys; EHS reports; Estimation or calculation
SmartGrowth BC (BC Sprawl Report 2004) - provides indicators for measuring urban form; livability; and economic vitality as well as links between each of them. None of these indicators were specifically designed for industrial areas. This is a selection of the indicators which could apply to or relate to industrial areas.				
Urban Form Indicators	Density of housing units - total number of housing units divided by the municipality's taxable land base, minus lands in the Agricultural Land Reserve)	Enables an assessment of the relative efficiency with which land is used in communities. However, it still includes some non-residential land, and some municipalities may have boundaries much larger than the urbanized area.	# housing units / land unit	Canada Census 2001, Statistics Canada total housing unit figures / Land Assessed for Taxation, Local Gov't Services and Infrastructure, BC Ministry of Community Aboriginal and Women's Affairs
	Hectares of Streets, Roads and Alleys Per 1,000 People	Provides a measure of the efficiency of the road network. Sprawled communities tend to require more road surface per capita. However, in some cases, roads are also used extensively to service the agricultural community.	ha / 1000 people	Sewer, Water Main, Road, and Street Distance in kilometres of Incorporated Municipalities.
	Kilometres of Sewer and Water Infrastructure Per 1,000 People	Compact communities generally require fewer kilometres of sewer and water mains per capita. The same caveat applies for ha / 1000 people.	km / 1000 people	Sewer, Water Main, Road, and Street Distance in kilometres of Incorporated Municipalities.
	% of Commuters Who Are Drivers of Automobiles (Modal Split for the Trip to Work)	One measure of the degree of dependence on the automobile, with many commuters being single occupancy drivers (SOVs)	%	Customize data from Statistics Canada
	% of Commuters Who Drive 5 Kilometres or Less	A measure of the distances between housing and jobs.	%	Customize data from Statistics Canada

TABLE A 1, continued

Indicator & Description (If Provided)			Units	Data Sources (if provided) / Comments
	The Mean Length of Commute for the Trip to Work	A measure of the distances between housing and jobs.	km	Customize data from Statistics Canada
Livability Indicators	Hectares of Parks and Playground per 1000 people	A measure of green space within a community. However, it does not give an indication of a community's proximity to other recreational lands.	%	Area and Population of Incorporated Municipalities; Local Gov't Services;
	Housing Diversity Index	A measure of the kinds of housing options that will be available for a variety of individuals and families.		
Cities Plus Submission: A Sustainable Urban System: Long Term Plan for Vancouver. Provides 8 catalyst strategies, each with "State of Strategy Indicators"				
Strategy 1:	Protect & Connect Blue Ribbons and Green Webs	Land protected in perpetuity for major parks and ecological reserves	%	
		Length of functioning stream corridors relative to pre-development	%	
		Dwellings located within easy walking distance of connected greenspace	%	
		Urban land area with effective imperviousness equivalent to pre-development levels.	%	
Strategy 2:	Design multi-use spaces and convertible structures	Buildings capable of connection to low temperature thermal energy networks	%	
		Urban spaces or buildings designed for two or more uses.	%	
Strategy 3:	Plan short loops and integrated infrastructure networks	Dwellings located within easy walking distance of a public transit stop	%	
		Neighbourhoods with a green utilities / eco-industrial hub	%	
		Dwellings located within easy walking distance of key services	%	
Strategy 4:	Become Net Contributors	Per capita ecological footprint	ha / capita	

TABLE A 1, continued

Indicator & Description (If Provided)			Units	Data Sources (if provided) / Comments
Strategy 5:	Experiment and learn as we go	Land use and infrastructure plans in the region that integrate ongoing monitoring and feedback	%	
		Number of public demonstrations of transferable sustainable technologies and practices.	#	
		Adults enrolled in continuing education courses annually (personal/professional development)	%	
Strategy 6:	Enhance the diversity of choices	Neighbourhoods with 25% or more multiple family housing units	%	
		Population owning vehicles by type (including self-propelled vehicles)	%	
Strategy 7:	Create shock resilient cells	Subregions capable of satisfying basic needs of population for 1 week in event of infrastructure disruption	%	
Strategy 8:	Green and clean the export chain	Firms that meet or exceed accepted international environmental management system standards	%	
		Firms that conduct regular green supply chain reviews	%	
Cities Plus "Indicators and Targets for Greater Vancouver" - indicators by categories				
Communi-cation Systems	Information and Communications Technology Connectedness Index	Index of 42 indicators including availability, price, reach, and use.	Score out of 108	
	% of population with internet access		%	
Cultural Systems	Community engagement index	index of selected indicators including involvement in community activities, volunteering, unpaid labour, extracurricular activities, attendance at public meetings, etc	%	
Decision Support Systems	% of municipalities providing real-time state of the environment reports		%	

TABLE A 1, continued

Indicator & Description (If Provided)			Units	Data Sources (if provided) / Comments
Energy Systems	% of total energy derived from renewable energy sources		%	
	% of electricity derived from renewable energy sources		%	
Governance Systems	% of participants involved in and satisfied with public engagement processes		%	
Health and Well-Being	Self-rated health	% of residents with a rating their health good or better	%	
Housing and Buildings Systems	% of building stock meeting or exceeding LEED Platinum standards or equivalent		%	
Human Security Systems	Personal safety index	index indicators in the areas of economic security, health security, and physical safety		
Materials Systems	Per capita solid waste disposed		kg / year	
Mobility Systems	% of Trips made by non-auto modes, 24 hour period		%	
	% of Land area used for roads and parking surfaces		%	
Water Systems	Per capita total potable water consumption		L / capita / day	
Visions, Tools and Targets: Environmentally Sustainable Development Guidelines for Southeast False Creek –provides a set of ecological objectives, indicators, and targets. Prepared for City of Vancouver as part of developing their comprehensive policy framework for the site.				

TABLE A 1, continued

Indicator & Description (If Provided)			Units	Data Sources (if provided) / Comments
Solid Waste	Reduce and manage the generation of neighbourhood solid waste	Per capita waste disposal per year	Kg / person / year	Haulage companies; landfill records
		Amount of organic waste produced and processed within SEFC	Kg / person / year	Survey waste quantities of centralized facilities
Transportation	Increase proximity to key activity centres	Percentage of dwelling units within 350m of basic shopping needs and personal services	% of dwelling units	GIS
	Increase pedestrian, bicycle and transit amenities within neighborhood	Percentage of street area that is dedicated to walking, cycling, and transit uses	% of street area	GIS
	Increase the convenience of public transit	Percentage of residential stock within 350m of transit services	% of residential stock	GIS
	Increase the match between housing types and affordability and the needs of workers	Percentage of dwelling units that are affordable, relative to the income distribution and family size of those working in the Downtown Core and Broadway Corridor.	% of dwelling units	Income classes/family size statistics; Stats Canada
Energy	Reduce non-renewable energy consumption	Non-renewable energy used by multi-unit residential and by office buildings	kWh/m2/yr	Elect for new construction assumed to come from non-renewable marginal capacity (Burrard Thermal generating station, at 34% efficiency)
	Increase neighbourhood generation of renewable energy	Renewable energy generated within the SEFC neighborhood	% of total annual energy consumption	Several assumptions made (see doc for details)
	Increase the diversity of energy sources used within the community	Percentage of buildings connected to a District Energy System	% of buildings in SEFC	Direct observation
	Reduce peak loads placed upon infrastructure	Peak electrical power demand for buildings	W / m2	Max peak hr electrical demand for multi-unit residential bldgs (supper time; coldest day of the year)
Air Emissions	Reduce concentrations of ground level ozone (smog)	Vehicle kilometers traveled by residents of SEFC	Average automobile km / person / year	Data from Stats Canada and City of Vancouver.

TABLE A 1, continued

Indicator & Description (If Provided)			Units	Data Sources (if provided) / Comments
	Reduce greenhouse gas emissions	C02 emissions from energy used for transportation	Kg / person / yr	
	Reduce chemical and biological contaminant emissions indoors	Percentage of dwellings designed and built with basic features that minimize pollutant levels	% of dwelling units	Provision of basic features that minimize indoor pollutant levels (see Doc for details)
Soil	Increase comprehensiveness of soil remediation strategies considered	Number of key strategies included in a soils options analysis	Minimum #	Soil assessment report
	Increase soil productivity	Quantity of leaves and other organic debris transported from SEFC neighborhood	Kg / person	City records of leaf collection and composting program.
		Amount of produce grown within the SEFC neighborhood	% of produce	Residents volunteering information; community garden coordinator
Water	Increase the efficient use of municipal potable water indoors and outdoors	Average residential municipal potable water use	L / capita / day	Water metering
	Reduce and manage surface run-off flows	Average imperviousness of total site area	%	Use specific imperviousness ratings for different surfaces.
	Reduce loadings and flows to municipal wastewater treatment plants	Percentage of sewage treated within the SEFC neighborhood	% of sewage	City's separate water and sewage utilities would incorporate metering on a dwelling unit basis.
Green Spaces	Increase quality and quantity of habitat provided for a range of appropriate species	Number of bird species surveyed in SEFC	# of species	Bird surveys
		Percentage of open space that has significant habitat value	% of open space	GIS; simple observation (areas with diversity of vegetation, landscape debris, tree canopies and other flora) *excludes turf covered areas*.
	Increase vegetative cover on the site	Percentage of total neighborhood roof area designed to carry plant life	% of total roof area	Survey mechanism; require bldg designers to include area of roof that can accommodate plant life in bldg permit application.
	Increase the quality and availability of	Percentage of foreshore length that has habitat value	% of foreshore	Visual assessment

TABLE A 1, continued

Indicator & Description (If Provided)			Units	Data Sources (if provided) / Comments
	marine and foreshore habitats		length	
	Increase presence of naturalized freshwater ecosystems	Status of daylighting of stream courses	Target to daylight x# of local streams	Presence / absence of daylighting strategies
Buildings	Increase appropriate siting of bldgs to contribute to community energy efficiency	Percentage of dwelling units and commercial spaces with good solar orientation	% of dwelling units	Require shadow analyses as part of bldg permit application process
	Increase the useful life of bldgs and materials	Percentage use of salvaged and/or recycled materials, components, systems	% of materials	Collected from architect/designer during design and construction of bldg.
Canadian Business For Social Responsibility - Good Company: Guidelines for Social Performance - provides checklists for different categories, but no units				
Community Checklist	Make an explicit community commitment:	• meet community demands for cost-effective products and services • meet community needs without apparent business benefit • partner with community-based organizations that support business success • engage in long-term strategic community partnerships		
	Donate 1% of pre-tax profits			
	Prioritize local employment and suppliers			
	Incorporate social / environmental values into purchasing decisions			
	Have a board and management team that understands community interests.			

TABLE A 1, continued

Indicator & Description (If Provided)			Units	Data Sources (if provided) / Comments
Environment Checklist	Comply with environmental law and regulations			
	Perform life cycle analysis on all products /services			
	Appoint one staff member with environmental responsibilities			
LEED Green Building Rating System for New Construction and Major Renovations V. 2.1 - Checklist divided into categories, with potential technologies and strategies associated with each. Industrial park/area indicators are adapted from these strategies.				
Sustainable Sites	Development density	To channel development to urban areas with existing infrastructure, protect greenfields and preserve habitat and natural resources. During the site selection process, give preference to urban sites.		
Alternative Transportation	Bicycle Storage & Changing Rooms	Design the building with transportation amenities such as bicycle racks and showering/changing facilities.		
	Alternative fuel vehicles	Provide transportation amenities such as alternative fuel refueling stations and carpool/vanpool programs. Consider sharing the costs and benefits of refueling stations with neighbors.		
	Parking Capacity	Minimize parking lot/garage size. Consider sharing parking facilities with adjacent buildings.		
Reduced Site Disturbance	Protect or Restore Open Space	Establish clearly marked construction boundaries to minimize disturbance of the existing site and restore previously degraded areas to their natural state.		
Stormwater Management	Rate and Quantity	Specify garden roofs and pervious paving to minimize impervious surfaces. Reuse stormwater volumes generated for non-potable uses such as landscape irrigation, toilet and urinal flushing and custodial uses.		
	Treatment	Design mechanical or natural treatment systems such as constructed wetlands, vegetated filter strips and bioswales to treat the site's stormwater.		

TABLE A 1, continued

Indicator & Description (If Provided)			Units	Data Sources (if provided) / Comments
Light Pollution Reduction		Minimize site lighting where possible and model the site lighting using a computer model. Technologies to reduce light pollution include full cutoff luminaries, low-reflectance surfaces and low angle spotlights.		
Water Efficiency	Innovative Wastewater Technologies	Specify high-efficiency fixtures and dry fixtures such as composting toilets and waterless urinals to reduce wastewater volumes. Consider reusing stormwater or greywater for sewage conveyance or on-site wastewater treatment systems (mechanical and/or natural).		
Energy & Atmosphere	Optimize Energy Performance	Quantify energy performance as compared to a baseline building.		
Materials and Resources	Storage and Collection of Recyclables	Designate an area for recyclable collection and storage that is appropriately sized and located in a convenient area. Identify local waste handlers and buyers for glass, plastic, office paper, newspaper, cardboard and organic wastes. Instruct occupants on building recycling procedures. Consider employing cardboard balers, aluminum can crushers, recycling chutes and other waste management technologies to further enhance the recycling program.		
Maplewood Community Eco-Industrial Partnership Project – Performance indicators. (*****Indicators which were discussed during the project but were not measured)				
Energy	Total electricity consumption - by land use - by sub-neighbourhood		kWh/y, $/y	BC Hydro billing records queried by address and aggregated to protect customer confidentiality. Projections were based on anticipated development (increase in square metres of space per land use type). Projections also assumed increases in efficiency associated with evolving technologies in the residential, commercial, and industrial sectors.
	Peak load - electricity consumption		kWh	BC Hydro billing records queried by address and aggregated to protect customer confidentiality.

TABLE A 1, continued

Indicator & Description (If Provided)			Units	Data Sources (if provided) / Comments
	Total natural gas consumption - by land use		GJ/y, $/y	Terasen (then BC Gas) billing records, queried by address then aggregated to protect customer confidentiality Projections were based on anticipated development (increase in square metres of space per land use type). Projections also assumed increases in efficiency associated with evolving technologies in the residential, commercial, and industrial sectors.
	Greenhouse gas emissions		$_eCO_2$ t/y	Need to know current and projected energy consumption by type e.g., natural gas, electricity and generation source. Data was available (see above). Emission factors taken from BC Hydro, Terasen, and Canada's Climate Change Action Plan.
	Natural gas displaced by green energy (like waste H_2)		$/y, GJ/y	Material and energy balance; must know (or assume) heat capacity and efficiency of new fuel. With respect to micro-hydro potential, BC Hydro completed the calculations for McCartney Creek.
	Natural gas displaced by better building and site design (ie building to LEED™ standard)		$/y, GJ/y	Energy balance, assumptions on % energy reduction for projections
	Electricity displaced by green power (like waste H_2)		$/y, MWh/y	Material and energy balance; must know (or assume) heat capacity and efficiency of new fuel
	Electricity displaced by better building and site design (ie building to LEED™ standard)		$/y, MWh/y	Energy balance, assumptions on % energy reduction for projections
Traffic	Truck traffic (by type of vehicle)		#/d	Manual traffic counts

TABLE A 1, continued

Indicator & Description (If Provided)			Units	Data Sources (if provided) / Comments
	Other traffic (by type of vehicle)*		#/d	DNV studies for Dollarton Highway expansion. Manual traffic counts.
	Vehicle fuel - all sectors (diesel; gasoline)		L	from Partners for Climate Protection* community energy report; direct fuel consumption data from businesses and DNV fleet manager
	Emissions from vehicle fuel - all sectors		kg $_e$CO2	From Partners for Climate Protection* community energy report. Re-calculated using emission factors in Canada's Greenhouse Gas Emission Inventory
	Emission reduction potential of biodiesel substitution		kg $_e$CO2	Environment Canada, Natural Resources Canada, Canada's GHG Emission Inventory, and other industry resources
	Amount of road right-of-way devoted to non-car use*		%	Design Brief did have a target of 60%. No baseline or quantification of charrette results were calculated.
Water	Residential Water Consumption		L/y per capita	Based on GVRD data for "average" residential water consumption. No residences are metered, so actual data is unavailable. DNV residential water rates were used to calculate $.
	Residential Irrigation Consumption		L/y per capita	Standard % of total potable water consumption, determined by GVRD guidelines. Design Brief had target to eliminate use of potable water for irrigation.
	Toilet Water Consumption		L/y per person	L/flush (CMHC, GVRD data) and # flushes per day (CMHC, GVRD data)
	Residential Population		#	Statistics Canada census data. At neighbourhood scale, need to get data per postal code
	Industrial, Commercial, Institutional Water Use		m3/y, $/y	Municipal water records, queried by address. These consumers have water meters, so accurate data was available.

TABLE A 1, continued

Indicator & Description (If Provided)			Units	Data Sources (if provided) / Comments
Sewage / Wastewater	Total non-industrial wastewater generated*		m3/y	No baseline data were available. For residential wastewater, estimates can be made based on per capita potable water consumption. For commercial, institutional, and smaller industrial operations, estimation is difficult.
	Total industrial wastewater generated*		m3/y	Only permitted industries must report their discharge volumes. Many of the industries in Maplewood did not have sewer discharge permits. Even with GVRD sewer discharge permit data, significant analysis and data manipulation is required. Many businesses cannot accurately calculate the amount of wastewater they generate. In general, wastewater is about equal to water consumed, except in industries where potable water becomes product or is lost in evaporation.
	Total Annual Cleaned Grey Water to Industry		m3/y	For Maplewood, estimated grey water generation as total water from municipal records minus standard irrigation volumes minus estimated black water generated from toilet flushing. Where an actual WWTP exists, can use
	Unit Cost to DNV and/or GVRD to Treat Residential Sewage*		$/m3	All wastewater generated in the DNV is treated in GVRD WWTPs. The GVRD is unable to estimate a $ per m3 cost to treat its wastewater.
Stormwater	Impervious surface area - can be broken into parking areas, land use type, geographic area, etc		%, fraction, ha, acres	Pervious / impervious surface areas available from GIS data (if linked to bldg permit info) or air photo measurements. Can also be estimated based on land use e.g. some land use bylaws regulate maximum site coverage. No baseline data available.
	Stormwater recovered for re-use - projections can be		m3/y	No baseline completed - need to obtain volumes from businesses recovering stormwater. For projections, need to

TABLE A 1, continued

Indicator & Description (If Provided)			Units	Data Sources (if provided) / Comments
	broken down per catchment area			know impervious surface area, stormwater catchment areas, rainfall, and loss rates. (This can be broadly estimated to start. More sophisticated models exist - see WaterBalanceTM
	Quality of stormwater management systems*		qualitative	Discussed in Design Brief, with a target to maximize use of ecologically-based management. No baseline or verification of charrette results completed.
	Stormwater infrastructure capital costs*		$/y	Discussed in Design Brief, with a target to reduce costs by 20%.
	Stormwater infrastructure operating and maintenance costs*		$/y	Discussed in Design Brief, with a target to reduce costs by 20%.
Land Use	Land use by type		%, acres	DNV Official Community Plan and GIS data. Projections based on manual calculation of land use areas from charrette team drawings.
	Density by land use type		Floor Space Ratio (FSR), Units / Acre	DNV Official Community Plan and GIS data. Projections based on manual calculation of land use areas from charrette team drawings and general FSR assumptions used by development consultants on each team. Land use categories were Port-Related Industry; Medium / Heavy Industry; Business Park; Commercial; Mixed-Use; Single Family Residential; Multi-Family Residential; Institutional; Roads / Services; and Open Space.
	Total building space		ft2, m2	DNV Official Community Plan and GIS data (drawing from building permit information). Projections based on manual calculation of land use areas from charrette team drawings and general FSR assumptions used by development consultants on each team.

TABLE A 1, continued

Indicator & Description (If Provided)			Units	Data Sources (if provided) / Comments
	Total building footprint		ft2, m2	DNV Official Community Plan and GIS data (drawing from building permit information). Projections based on manual calculation of land use areas from charrette team drawings and general FSR assumptions used by development consultants on each team. No baseline data was available.
	Impervious surface area - can be broken into parking areas, land use type, geographic area, etc		ft2, m2	Pervious / impervious surface areas available from GIS data (if linked to bldg permit info) or air photo measurements. Also estimated based on land use and standard FSR estimates calculated by development consultants familiar with the local market. Required that charrette teams complete a parcelization plan, so this was only calculated for Team 3. Baseline could not be calculated.
	Open Space with habitat quality*		%	Listed as a target in the Design Brief (75%). Baseline never calculated. Quantification of charrette results never completed.
	Distance from most residences to shops and services*		m	Listed as a target in the Design Brief (400 m). Baseline never calculated. Quantification of charrette results never completed.
	Number of buildings oriented to take advantage of passive solar gain*		%	Listed as a target in the Design Brief (75% of new buildings). Baseline never calculated. Quantification of charrette results never completed.
Economic / Business	Development Cost Charges by land use type		$/y	Baseline calculated using DNV tax data; projections based on current mill rates and projected increases in development and redevelopment
	Property Taxes by land use type		$/y	Baseline calculated using DNV tax data. Projections based on current mill rates and projected increases in development and redevelopment.

TABLE A 1, continued

Indicator & Description (If Provided)			Units	Data Sources (if provided) / Comments
	Business base diversity		# by sector	DNV business permit lists. Special focus given to recycling and related businesses, the "scavengers and decomposers" of an industrial ecosystem
	Number of local jobs held by residents*		#	Listed as a target in the Design Brief (# local jobs = # local labour force). Baseline never calculated. Quantification of charrette results never completed.
Materials Management	Number of resources shared among businesses*		#, qualification	Listed as a target in the Design Brief (maximize number of resources shared among businesses). Baseline never calculated, although synergies were qualified and quantified for a number of businesses (source was data provided by businesses). Due to confidentiality concerns, this data could not be included in the report. Quantification of charrette results never completed.
	Material Consumption		material name, t/y	Only a partial qualitative list was made available in the report, mostly comprising materials handled by North Shore Recycling. This indicator requires that businesses provide material consumption data, and allow this data to be made publicly available. This was not the case in Maplewood. Materials data was collected for several companies, however.
	Solid waste diverted from landfill*		t/y, %	Data is difficult to obtain. Residential solid waste pick-up is contracted out; this company may be able to provide an estimate for Maplewood. Commercial and industrial pick-up is completed privately and under individual contract. Best data are from companies themselves. Limited, unpublishable data were collected. Baseline was not calculated. Design Brief contained a

TABLE A 1, continued

Indicator & Description (If Provided)			Units	Data Sources (if provided) / Comments
				target of 50% diversion.
Cool Vancouver Task Force Community Climate Change Action Plan - Indicators are referred to as "strategies", and targets (in tonnes of CO2 emissions reduction), are set.				
GHG Emissions General Indicators	Total CO2 emissions. Target: 6% reduction below 1990 levels by 2012	Vancouver's "fair share of Canada's 6% reduction target" translates to a 409,000 tonne reduction in annual GHG emissions from the 2012 business-as usual emissions forecast. (Down to 2.75 million tonnes from 1990's 2.9 million tonnes). Will focus on residential and commercial building energy use, and reducing emissions from light vehicles.	Tonnes $_e$CO2	
	Interim Target: Reduction of emissions to 1990 levels by 2010	In time for 2010 Olympics	Tonnes $_e$CO2	
Buildings	Market Housing Retrofits	Promote community awareness/access to existing resources and develop new tools to maximize home energy improvements and retrofits.	Tonnes $_e$CO2	
	Non-Market Housing Retrofits	Development and implementation of a strategy to increase the energy efficiency of non-market units in Vancouver	Tonnes $_e$CO2	
	Medium and Large Commercial Building Retrofits	Collaborative work between the City, utilities, other levels of government, and building owners/operators to develop tools and incentives to achieve deeper market penetration of energy efficiency programs in medium and large office buildings, hotels, warehouses, and nonfood retail.	Tonnes $_e$CO2	
	Tenant/Staff Energy Awareness	Development and promotion of an energy awareness program with messaging potentially incorporated into the proposed Integrated Marketing Program	Tonnes $_e$CO2	
	Institutional Building Retrofits	Collaboration between the City and major institutions such as the Health Board, School Board, Community Colleges, and other levels of Government to share	Tonnes $_e$CO2	

TABLE A 1, continued

Indicator & Description (If Provided)			Units	Data Sources (if provided) / Comments
		information on the benefits and challenges of energy efficiency retrofits and to build commitment to getting their house-in-order.		
	Small Commercial Building Retrofits	Collaboration with BC Hydro, Terasen, senior governments, BIAs and other stakeholders to promote retrofits for small businesses ("Mom and Pop's") throughout the city, starting with lighting retrofits and promoting other energy efficiency measures where appropriate.	Tonnes $_{e}CO2$	
	Update the City's Energy Utilization By-law	Upgrade of the energy efficiency requirements of the City's Energy Utilization By-law to current standards as a key first step in improving the energy efficiency of new buildings.	Tonnes $_{e}CO2$	
	Energy Efficient New Construction	Development of programs to ensure new commercial and multi-family buildings meet the requirements of the Commercial Building Incentive Program (CBIP) which exceeds ASHRAE 90.1 (2001)) by 10% to 15%.	Tonnes $_{e}CO2$	
	Regulate the Energy Efficiency of Appliances	Advocacy to the Province and Federal Governments to increase the minimum efficiency of common appliances in buildings.	Tonnes $_{e}CO2$	
	Energuide 80 for New Detached Housing	Advocacy and support for the Province and Natural Resources Canada in their work to improve energy efficiency of new detached and semi-detached homes to at least an Energuide 80 rating.	Tonnes $_{e}CO2$	
Transportation	Biodiesel Blends	Use the purchasing power of Municipal fleets to support the development of local biodiesel production and work with producers and other level of government to make this alternative fuel cost neutral.	Tonnes $_{e}CO2$	
	Ethanol-blended gasoline	Research the environmental and operational implications of ethanol blended fuels and seek way to promote increased use.	Tonnes $_{e}CO2$	
	Efficient vehicle operation	Promote fuel efficient driver training programs and establish an anti-idling bylaw to reduce unnecessary fuel consumption.	Tonnes $_{e}CO2$	
	Efficient vehicles	Research and advocate for timely implementation of increased federal fuel efficiency standards and seek ways to promote the purchase of the most efficient vehicle that meets purchasers' needs.	Tonnes $_{e}CO2$	

TABLE A 1, continued

Indicator & Description (If Provided)			Units	Data Sources (if provided) / Comments
	Transportation alternatives	Develop a package of initiatives that increases the provision of viable transportation alternatives while simultaneously encouraging the use of these alternatives. • Work with TransLink to provide improved transit service • Increase walking and cycling infrastructure • Expand individualized marketing of transportation alternatives • Promote clean commuting options • Support clean trips to school • Expand participation in car-sharing • Explore transportation pricing strategies	Tonnes $_{e}CO2$	

TABLE A2: INDICATORS LITERATURE REVIEW – CORPORATE DOCUMENTS
Indicators measured in most recent sustainability reports of Canadian businesses (with industrial operations)
Listed on the Dow Jones Sustainability Index.

Indicator	Units	Alcan	Dofasco	Domtar	NeXen	Suncor	Trans Alta	TransCanada
Economic / Business								
Earnings before interest and taxes per shipped ton	$		X				X	
Material & Energy Purchases	Mil $	X	X					
Direct local purchases	Mil $	X	X					
Production	GWh						X	X
Social								
Local Job Creation	#	X						

Community / environmental donations	$ / volunteer hrs
	$ fundraised
	$ donated
	lands donated
		X	X	X	X	X	X	X

Donations by sector	%		X	X	X			
Total wages plus material and energy purchases	Mil $		X					
Employee Turnover	%	X	X	X	X	X		
Participation in Capacity Building Programs	# employees		X	X	X			
Gender/workforce diversity - e.g. % of total employees who are female	%		X			X		
Visits to onsite fitness facility	#		X					
Paid extension or part-time courses for employees	$		X					
Investment in employee apprenticeship program	$		X					
Employee satisfaction	%		X			X		
Injury frequency	# /100 employees/yr	X	X	X	X	X	X	X
Disclosed Incidents	#	X						

TABLE A2, continued

Indicator	Units	Alcan	Dofasco	Domtar	NeXen	Suncor	Trans Alta	TransCanada
Employee EH&S program participation	% $ spent	X	X	X	X	X	X	X
Regulatory fines / compliance	$					X	X	X
Energy								
Energy Consumption	GJ / year	X	X	X	X	X		
Energy intensity	GJ / tonne product	X	X	X	X	X		
Energy Performance	kWh / amount of product		X					
GHG Emissions Intensity GHG Emissions	kg C02 / tonne product tonnes / year	X	X	X	X	X X	X X	X X
Natural Gas Consumption Reduction	%	X	X					
Energy Derived from Renewable Resources	% MW / source			X			X X	X
Energy Capacity by Fuel Type (Coal; Gas; Hydro & Renewables	%						X	
Energy Capacity by Geography	%						X	
Green Power investments	$ MW				X X	X X		
Facility energy/cost reduction measures	kWh $ saved				X X			
Total gas flared	m3 / yr				X	X		
Air Quality								
PAH Emissions to Air	tonnes / yr % reduction kg / tonne shipped product	X	X					
Air emissions (N0X; S02)	kg / tonne product	X	X		X	X	X	
S02 Emission Intensity	kg/MWhr						X	
particulate emissions to air from all sources	kg / tonne product		X	X	X		X	
Mercury emission	kg						X	

TABLE A2, continued

Indicator	Units	Alcan	Dofasco	Domtar	NeXen	Suncor	Trans Alta	TransCanada
Benzene Emissions	kg / tonne product tonnes / year		X			X		
Consumption of Gas Chlorine	kg / tonne primary Al produced	X						
Odour complaints	#		X					
Wastewater / Sewage								
Industrial Wastewater Treatment (post treatment WW quality)	particles in suspension (kg/day) Aluminum (kg/day)	X						
Substances in Water (TSS; Cyanide; Ammonia; Pb, Zn; Phenolics)	kg/day		X	X				
Total process effluent to Hamilton Harbour	g/tonne of steel shipped		X					
TSS; Ammonia; Zn; Phenolics and COD to Hamilton Harbour	g/tonne of steel shipped		X					
Water Use Intensity Water Use	m3 / tonne product m3 / year	X X	X X	X X	X X	 X	X X	
Release of PAHs to Effluent	tonnes / yr	X						
Volume of water recycled	m3	X				X		
Water quality downstream of operations				X				
Vol treated water pumped to nearby lake	m3						X	
Efficiency Index for Water Management (the actual production of electrical power and the amount of power that could have been produced had the water input and the availability of turbine-alternator groups been optimal.)	%	X						
Materials Management								
Materials Intensity	kg / tonne product			X				

TABLE A2, continued

Indicator	Units	Alcan	Dofasco	Domtar	NeXen	Suncor	Trans Alta	TransCanada
Materials Recycling	tonnes %	X	X	X				
Solid waste disposal	kg / tonne product			X				
Materials recycled through blue box program	tonnes		X					
Total wastes	tonnes				X		X	
Office materials use	$ saved							X
Dangerous and Non-Dangerous wastes	tonnes / yr	X	X			X		
Recycled or Recovered Residues	%	X	X					
By-product use	% coal ash, gypsum, gravel sold						X	
Power Operations - Total Residues	tonnes / yr	X						
Residues requiring treatment	%	X						
Caustic Consumption Reduction	tonnes	X						
Various direct releases of substances to environment	tonnes/year		X					
Environmental incidents (spills; exceedances)	#	X	X	X	X			X
Land Use								
Land use for operations	ha					X		
Land reclamation	% disturbed vs % reclaimed						X	

APPENDIX B: DOCUMENT LIST

Table B1: Document List

	Title	Publishing Org	Year	Author(s)	Website / Server Location	Date Accessed (if electronic)	Journal Citation
1	A Transect of Environmental Performance	Criterion Planners	2004		\Corporate Documents\Criterion Energy Performance of Sacramento.pdf		
2	BC Sprawl Report: Economic Vitality and Livable Communities	SmartGrowthBC	2004	Alexander, D; Tomalty, R; Anielski, M	\Corporate Documents\BC Sprawl Report/Sprawl2004.pdf	25-Nov-04	
3	Bold Moves: 2004 Annual Report	Cognos Inc	2004		\Corporate Documents\Dow Jones Sustainability Index\Canadian Companies\Cognos Inc\cognos_ar_2004.pdf	26-Nov-04	
4	Challenges in using environmental indicators for measuring sustainability practices	NRC Research Press	2002	Tam E.K.L.	\Academic Docs\Challenges in using environmental indicators.pdf		Journal of Environmental Engineering and Science, vol. 1, no. 6, pp. 417-425(9)
5	Charting Turbulent Times: 2003 Annual Report	Domtar Inc	2003		\Corporate Documents\Dow Jones Sustainability Index\Canadian Companies\Domtar\DomtarAnnreport_2003.pdf	26-Nov-04	
6	citiesPLUS Indicators and Targets for Greater Vancouver	The Sheltair Group	2003	The Sheltair Group	\Corporate Documents\Cities Plus\IndicatorsandTargets.pdf		
7	Corporate Social Responsibility Report and Public Accountability Statement	RBC Financial Group	2003		\Corporate Documents\Dow Jones Sustainability Index\Canadian Companies\Royal Bank of Canada/2003CorporateResponsibilityReport-en.pdf	26-Nov-04	
8	Dow Jones Sustainability Index	Dow Jones Indexes, STOXX Limited and SAM Group			http://www.sustainability-indexes.com/	26-Nov-04	
9	Dow Jones Sustainability Index	DJSI-World	2004		\Corporate Documents\Dow Jones Sustainability Index\DJSIWorld_company_Rev2004.pdf		

Table B1: Document List *continued*

	Title	Publishing Org	Year	Author(s)	Website / Server Location	Date Accessed (if electronic)	Journal Citation
10	Earning the Right: RBC 2003 Annual Report	RBC Financial Group	2003		\Corporate Documents\Dow Jones Sustainability Index\Canadian Companies\Royal Bank of Canada/annual report RBC.pdf	26-Nov-04	
11	Eco-Efficiency Indicators Workbook	National Roundtable on the Environment and Economy		IndEco Strategic Consulting & Carol Burnham Consulting	\Government Documents\NRTEE Eco-efficiency_Workbook.pdf	25-Nov-04	
12	Econnections: Linking the environment and the economy	Statistics Canada	2000	Statistics Canada	http://www.statcan.ca/english/ads/16-200-XKE/index.htm	11-Jan-04	
13	Environmental and Sustainable Development Indicators for Canada	National Roundtable on the Environment and Economy	2003	NRTEE	\Government Documents\Envmt and SD Indicators for Canada.pdf		
14	For What Matters: 2003 Annual Report	Canadian Imperial Bank of Commerce	2003		\Corporate Documents\Dow Jones Sustainability Index\Canadian Companies\CIBC\CIBC 2003 annual report.pdf	26-Nov-04	
15	Good Company: Guidelines for Corporate Social Performance	Canadian Business for Social Responsibility	2002	Canadian Business for Social Responsibility	\Corporate Documents\CBSR/GoodCompany - SummaryDocument.pdf	26-Nov-04	
16	GUIDELINES FOR THE DEVELOPMENT OF SUSTAINABILITY INDICATORS (Sustainable Community Indicators Program)	Environment Canada and Canada Mortgage and Housing Corporation	2001	Michael Ditor, Indicators and Reporting Office, Environment Canada	http://www.ec.gc.ca/soer-ree/English/scip/guidelines.cfm	11-Jan-04	
17	In Pursuit of Sustainability	Dofasco Inc	un-known		\Corporate Documents\Dow Jones Sustainability Index\Canadian Companies\Dofasco	26-Nov-04	

Table B1: Document List *continued*

	Title	Publishing Org	Year	Author(s)	Website / Server Location	Date Accessed (if electronic)	Journal Citation
					Inc\21_Dofasco-In-Pursuit-of-Sustainability.pdf		
18	Indicators for Eco-Efficiency in Recycling Systems	NTNU Industrial Ecology Programme (Paper presented at International Society of Industrial Ecology Conference)	2001	Arne Eik	\Academic Docs\ISIE2001Indicators in Recycling systems.doc	12-Jan-04	
19	Indicators for measuring environmental sustainability: A case study of the pharmaceutical industry	Emerald Group Publishing Limited	2003	Veleva V.; Hart M.; Greiner T.; Crumbley C	*Abstract only*		Benchmarking: An International Journal Vol 10 (2) pg: 107-119
20	Indicators of Sustainable Community	Sustainable Seattle	1998	Sustainable Seattle	\Government Documents\SustCommINdicators Seattle 1998.pdf		
21	Industrial Ecosystems As FoodWebs	MIT Press	2002	Graedel, T and C. Hardy	*Abstract only*		Journal of Industrial Ecology Vol 6 (1) pg. 29-38
22	InfraGuide: Innovations and Best Practices	National Research Council			http://www.infraguide.ca/bestPractices/default_e.asp	25-Nov-04	
23	Integrated ecological optimization of processes with the sustainable process index	Elsevier Science	2000	Narodoslawsky M.1; Krotscheck C.	\Academic Docs\Sustainable Process Index.pdf		Waste Management vol. 20, no. 8, pp. 599-603(5)
24	ISO 14031: Environmental Performance Evaluation		2002	Putnam, D	\Corporate Documents\ISO 14031\ISO 14031.pdf	26-Nov-04	Draft Submitted to Confederation of Indian Industry for publication in their Journal. September 2002

Table B1: Document List *continued*

	Title	Publishing Org	Year	Author(s)	Website / Server Location	Date Accessed (if electronic)	Journal Citation
25	Leading the Way: Corporate Social Responsibility Report	Telus Corporation	2003		\Corporate Documents\Dow Jones Sustainability Index\Canadian Companies\Telus Corp\telus_csr_2003.pdf	26-Nov-04	
26	LEED Canada Adaptation and BREEAM/Greenleaf Harmonization Studies. Part 2: LEED - Canada Guide	Athena Sustainable Materials Institute	2002	Environmental Research Group University of British Columbia	\Government Documents\LEED\LEEDCanada.pdf		
27	LEED Green Building Rating System for New Construction and Renovations Version 2.1	US Green Building Council	2002	US Green Building Council	\Government Documents\LEED\LEED_RS_v2-1.pdf		
28	LEED Version 2.1 Registered Project Checklist	US Green Building Council	2002	US Green Building Council	\Government Documents\LEED\LEED-NC_checklist-v2.1.xls		
29	Making the Link: Sustainability Report 2003	Nexen Inc	2003		\Corporate Documents\Dow Jones Sustainability Index\Canadian Companies\Nexen\Nexen 2003_sustainability_report.pdf	26-Nov-04	
30	Measuring Eco-Efficiency: A Guide to Reporting Company Performance	World Business Council for Sustainable Development	2000	Verfaillie, H; Bidwell, R.	\Corporate Documents\WBCSD\MeasuringEE.pdf	26-Nov-04	
31	Moving Towards a Sustainable Future: 2003 Social Responsibility - A Balance Sheet Report	Alcan in Quebec	2003		\Corporate Documents\Dow Jones Sustainability Index\Canadian Companies\Alcan Inc\Alcan 2003 CSR Report.pdf	26-Nov-04	
32	Developing Indicators and Benchmarks	National Guide to Sustainable Municipal Infrastructure	2003		\Government Documents\Canada InfraGuide\developing indicators and benchmarks.pdf	11-Jan-04	
33	Position Paper in Recognition of the	Alcan in Quebec	2003	Engren, T	\Corporate Documents\Dow Jones Sustainability Index\Canadian	26-Nov-04	

Table B1: Document List *continued*

	Title	Publishing Org	Year	Author(s)	Website / Server Location	Date Accessed (if electronic)	Journal Citation
	International Year of Freshwater				Companies\Alcan Inc\Sustainable Water Mgmt.pdf		
34	Power to Change the World: 2003 Annual Report	Ballard Power Systems Inc	2003		\Corporate Documents\Dow Jones Sustainability Index\Canadian Companies\Ballard Power Systems\2003Report_whole.pdf	26-Nov-04	
35	Progress Toward Sustainable Development: 2003 Sustainable Development Report	Shell Canada Ltd	2003		\Corporate Documents\Dow Jones Sustainability Index\Canadian Companies\Shell Canada Ltd\sd03.pdf	26-Nov-04	
36	Standardized Eco-Efficiency Indicators: Report 1: Concept Paper	Ellipson	2001	Muller, K; Sturm, A.	http://www.ellipson.com/files/studies/EcoEfficiency_Indicators_e.pdf	25-Nov-04	
37	Strength of Purpose; It's In Us: 2003 Annual Report	Dofasco Inc	2003		\Corporate Documents\Dow Jones Sustainability Index\Canadian Companies\Dofasco Inc\Annualeng03.pdf	26-Nov-04	
38	Sustainability Indicators for Swiss Dairy Farms and the general implications for business/government interdependencies	Sage Publications	2004	Mann, S; Gazzarin, C	/Academic Docs/Sustainability Indicators for Dairy Farms.pdf		International Review of Administrative Sciences. Vol 70(1) 111-121
39	Sustainability Within a Generation: A New Vision for Canada	David Suzuki Foundation	2004	Boyd, D.R.	\Government Documents\Suzuki Vision paper.pdf	26-Nov-04	
40	The citiesPLUS Submission: "A Sustainable Urban System: The Long-term Plan for Greater Vancouver"	The Sheltair Group	2003	The Sheltair Group	http://www.sheltair.com/library_usp.html	24-Nov-04	
41	The Maplewood Project: Sustainable Community Planning and Eco-Industrial Development in a West Coast Community	District of North Vancouver	2004	District of North Vancouver	http://www.maplewoodproject.org/article.asp?a=9&c=1		
42	TransAlta 2003 Report on Sustainability	Trans Alta Corporation	2003		\Corporate Documents\Dow Jones Sustainability Index\Canadian Companies\Trans Alta Corp\TransAlta%202003_RS_Final	26-Nov-04	

Table B1: Document List *continued*

	Title	Publishing Org	Year	Author(s)	Website / Server Location	Date Accessed (if electronic)	Journal Citation
					.pdf		
43	TransCanada 2003 Social Responsibility Annual Report	Transcanada Corporation	2003		\Corporate Documents\Dow Jones Sustainability Index\Canadian Companies\Transcanada Corp\transcanadacorp_sustain_report_2003.pdf	26-Nov-04	
44	WBCSD Project on Eco-Efficiency Metrics & Reporting - State-Of-Play Report	World Business Council for Sustainable Development	1998	Lehni, M	\Corporate Documents\WBCSD\WBCSD stateofplay report on EE.pdf		
45	What's At Stake? Our Journey Toward Sustainability: Report on Sustainability	Suncor Energy Inc	2003		\Dow Jones Sustainability Index\Canadian Companies\Suncor Energy Inc\25_SuncorSDReport2003.pdf	26-Nov-04	
46	Working With Them in Mind: Sustainability Report	AMCOR	2003		\Corporate Documents/Amcor Sustainability Report 04.zip/Sustainability_Report.pdf	26-Nov-04	