

the need for greater attention to the spectrum of sustainability requirements, with a high-priority focus on critical issues such as air and water quality, biodiversity, and climate change. Some of the other laggards, including Nepal and Afghanistan, face broader challenges such as civil unrest, and their low scores can almost all be attributed to weak governance.

REFINING METRICS

Innovations in the 2020 EPI data and methodology reflect the latest advances in environmental science and indicator analysis. Notably, the 2020 rankings include for the first time a waste management metric and a pilot indicator on CO₂ emissions from land cover change. Other new indicators deepen the analysis of air quality, biodiversity & habitat, fisheries, ecosystem services, and climate change. Full documentation of the methodology is available online at epi.yale.edu, and the EPI team invites feedback and suggestions for strengthening future versions of the Index.

While the EPI provides a framework for greater analytic rigor in policymak-

ing, it also reveals a number of severe data gaps that limit the analytic scope of the rankings. As the EPI project has highlighted for two decades, better data collection, reporting, and verification across a range of environmental issues are urgently needed. The existing gaps are especially pronounced in the areas of agriculture, water resources, and threats to biodiversity. New investments in stronger global data systems are essential to better manage sustainability challenges and to ensure that the global community does not breach fundamental planetary boundaries.

The inability to capture transboundary environmental impacts persists as a limitation of the current EPI framework. While the current methodology reveals important insights into how countries perform within their own borders, it does not account for “exported” impacts associated with imported products. With groundbreaking models and new datasets emerging, the EPI team has been working to produce new metrics that account for the spillovers of harm associated with traded goods in an interconnected world.

GLOBAL PANDEMIC

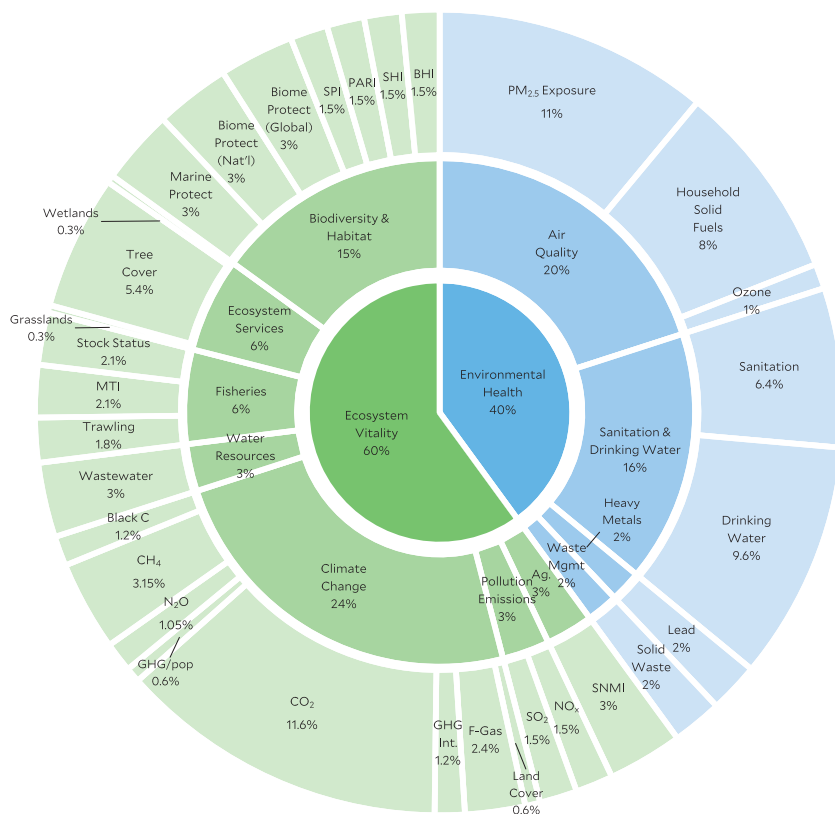
The 2020 EPI emerges in the midst of the COVID-19 crisis that has challenged public health systems and disrupted economic activity across the world. The global pandemic has made clear the profound interdependence of all nations and the importance of investing in resilience. Unintended consequences of the economic shutdown in many nations include a sharp drop in pollution levels and the return of wildlife. The EPI team hopes that this unexpected glimpse of what a sustainable planet might look like from an ecological perspective – albeit at a terrible price in terms of public health and economic damage – will inspire the policy transformation required for a sustainable future that is both economically vigorous and environmentally sound.

CREATING A COMPOSITE INDEX

As a composite index, the Environmental Performance Index distills data on many indicators of sustainability into a single number. Advances in scientific investigation, sensing methods, and data reporting mean the world's access to data on the state of the environment has never been richer. With every iteration of the EPI, we seek the best available data to produce useful and credible scores that address urgent questions.

For the 2020 EPI, we've assembled 32 indicators of environmental performance for 180 countries. The data come from trusted third-party sources like international governing bodies, nongovernmental organizations, and academic research centers. Credible datasets rely on established collection methods that have been peer-reviewed by the scientific community or endorsed by international authorities.

To give our metrics meaning to a broad audience, we take the data we receive and construct indicators on a 0–100 scale, from worst to best performance. For each country, we then weigh and aggregate the scores for indicators into issue categories, policy objectives, and then, finally, into an EPI score. Scores for all countries can be viewed or downloaded at our website, epi.yale.edu.



The 2020 EPI Framework. The framework organizes 32 indicators into 11 issue categories and two policy objectives, with weights shown at each level as a percentage of the total score.

This assessment of greenness has several limitations associated with the use of NDVI to represent greenness, including the coarse resolution of the MODIS data and the selection of the 0.5 NDVI cut-off as a threshold to classify green or grey pixels. As well, no distinction was made between greenness resulting from publicly accessible parks and private inaccessible spaces. For trend analysis, assessment of additional time series data is required, while higher resolution data is needed for the identification of detailed urban green spaces. A next step for this work will be the assessment of green space extent and greenness condition using more spatially-detailed datasets and additional time periods.

Greenness lowest in large urban population centres

In 2019, 76% of the area in 996 population centres in southern Canada could be classed as green (Table 1). This percentage varied based on city size and regional differences.

In large urban population centres, an average of 70% of the total land area was classed as green, with the share ranging from 38% in Winnipeg to 94% in Kanata (Chart 1). These values reflect peak summer greenness and can vary greatly depending on local climate conditions. A comparison of the top five large urban population centres shows that 65% of Toronto, 70% of Montreal, 68% of Vancouver, 42% of Calgary and 60% of Edmonton were classed as green in 2019 (Figure 2).

Average urban greenness was 78% for medium population centres and 87% in small population centres. In over one-third (35%) of small population centres the entire area was classed as green. Population centres across the Prairies had the lowest greenness on average. Greenness was highest in the Atlantic provinces.

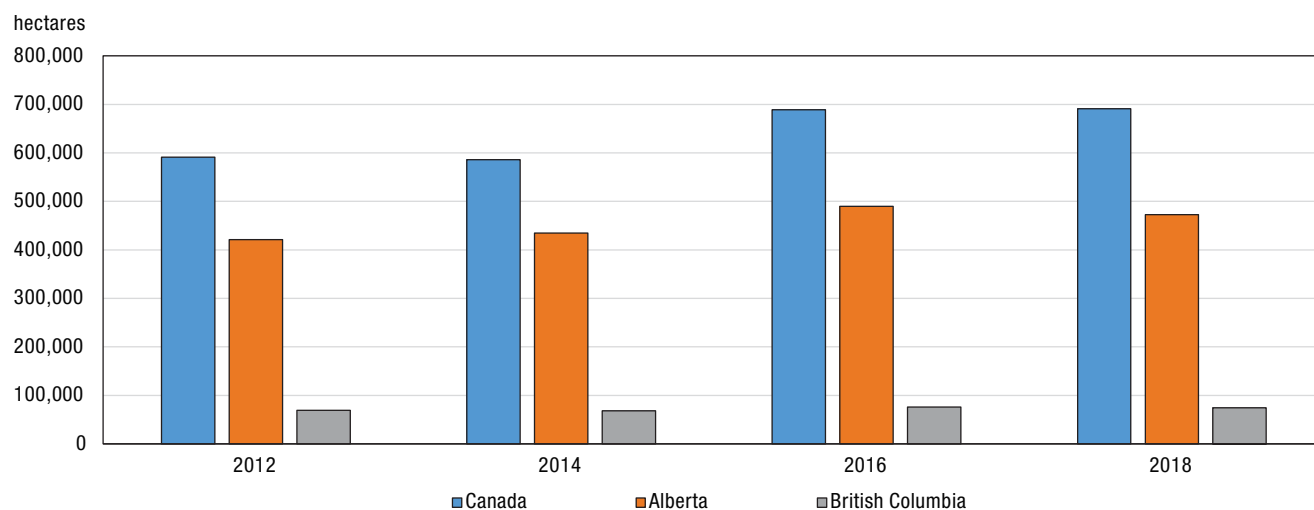
Table 1
Average urban greenness, by population centre size class and region, 2001, 2011 and 2019

Average urban greenness, by population centre size class and region, 2001, 2011 and 2019										
	Population centres	Average urban greenness			Type of urban greenness change					
		2001	2011	2019	2001 to 2011			2001 to 2019		
					Decrease	Stable	Increase	Decrease	Stable	Increase
Total population centres	996	80.3	80.3	75.7	27.0	35.2	37.8	38.8	30.1	31.1
Size classes										
Large urban	31	75.8	75.4	69.6	29.0	16.1	54.8	77.4	0.0	22.6
Medium	58	82.0	81.6	77.7	46.6	12.1	41.4	70.7	8.6	20.7
Small	907	88.3	89.1	87.0	25.7	37.4	36.9	35.4	32.5	32.1
Regions										
Atlantic	101	94.3	95.6	93.9	6.9	55.4	37.6	20.8	50.5	28.7
Québec	268	86.0	87.2	82.8	13.1	51.1	35.8	30.6	43.7	25.7
Ontario	286	81.8	81.4	78.7	26.6	37.1	36.4	38.1	33.6	28.3
Prairies	234	61.5	62.6	55.5	41.9	9.8	48.3	43.6	8.1	48.3
British Columbia	107	84.0	80.6	72.9	49.5	27.1	23.4	67.3	15.9	16.8

Notes: Estimates of population centre greenness are based on the Normalized Difference Vegetation Index (NDVI) from MODIS. Water areas have been excluded. Includes population centres south of 60° latitude based on the 2016 population centre boundaries for all years to ensure consistency. Change in greenness compares the point in time to 2001 and does not represent a trend over time.

Source: Statistics Canada, Environment and Energy Statistics Division, special tabulation from Statistics Canada, 2020, [Corrected representation of the NDVI using historical MODIS satellite images \(250 m resolution\) from 2000 to 2019](https://open.canada.ca/data/en/dataset/dc700f75-19d8-4913-9846-78615ca93784), <https://open.canada.ca/data/en/dataset/dc700f75-19d8-4913-9846-78615ca93784> (accessed April 29, 2020).

Chart 2
Farm land area that received irrigation per region, 2012 to 2018



Note: Canada excludes Yukon, Northwest Territories and Nunavut.

Source: Statistics Canada. Table 38-10-0241-01. Total area that received irrigation by crop type.

Alberta accounted for nearly 70% of the land receiving irrigation in Canada, followed by British Columbia (11%) in 2018. Saskatchewan reported the strongest growth of all provinces that year with an additional 16,746 hectares irrigated, a 43% increase over 2016.

In 2018, more than nine out of 10 irrigated hectares were field crops (58%) and forage crops (34%); these shares were relatively steady for all previously reported years.

Sprinkler systems were the dominant method of irrigation

Over the period, two-thirds of Canadian farms that irrigated reported using the sprinkler irrigation method which distributes water above the crop canopy. The second most commonly used method was micro-irrigation (one quarter of farms), which efficiently delivers water onto the soil surface very close to the crop or below the soil. Finally, one-tenth used surface irrigation, where water flows over the soil surface by gravity, either by flooding or in furrows. The choice of irrigation methods depends on a number of factors such as crop type, water quality, and precipitation levels during growing seasons.

By a wide margin, most provinces reported sprinkler irrigation as the most used between 2012 and 2018. Sprinkler irrigation in Quebec and Saskatchewan lead by a smaller margin but farmers reported using micro-irrigation in Quebec and surface irrigation in Saskatchewan to a greater extent than the other provinces.

An increasing number of farms using irrigation implemented water and energy conservation practices

At the Canada level, in 2018, the most widespread practices implemented to conserve water or energy were incorporating compost or other organic matter into soil (18%), watering at night or in the morning (18%), and using water or energy saving nozzles (17%). Increases in the use of conservation practices by farms over the period were noteworthy in Saskatchewan, which reported an increase of 75%, followed by the Atlantic Provinces (+62%).

Founded: 1956

Languages Spoken: English

Products/Services/Areas of Expertise: Benmet Steel & Metal is a scrap metal recycling company.

Domestic Markets: Ontario

BEPI Environmental Consultants

Also Known As: BEPI

#201, 704 Mara St.

Point Edward, ON N7V 1X4

519-337-0228

www.bepi.ca

www.linkedin.com/company/bepi-environmental

Firm Type: Management Consulting

Founded: 1986

Languages Spoken: English

Products/Services/Areas of Expertise: BEPI offers consulting, design, & construction services, as well as microbial products.

Domestic Markets: National

Foreign Activity: International

Bryan Ball; Vice-President

Bercha Group

Former Name: Bercha Engineering Limited

P.O. Box 61105, Stn. Kensington

Calgary, AB T2N 4S6

403-270-2221

Fax: 403-270-2014

www.berchagroup.com

bgroup@berchagroup.com

Firm Type: Engineering

Founded: 1975

Languages Spoken: English; French; Spanish

Products/Services/Areas of Expertise: Risk analysis; environmental risk assessment; engineering, operational & environmental simulation; remote sensing & GIS; digital image analysis; structural mechanics & dynamics; ice & iceberg mechanics; polar & frontier engineering; made up of three companies Bercha Engineering responsible for services in Canada, Bercha International deals with all international work & Bercha (Malaysia) Sdn. Bhd. responsible for services in Malaysia

Domestic Markets: National

Foreign Activity: Asia; Central America; Middle East; South America; USA

Dr. Frank G. Bercha, P.Eng.; President

Berg Chilling Systems Inc.

51 Nantucket Blvd.

Toronto, ON M1P 2N5

647-492-3664

Fax: 416-755-3874

berg-group.com

info@berg-group.com

www.linkedin.com/company/berg-chilling-systems-inc-

www.youtube.com/c/BergGroupProcess_Chilling

Firm Type: Distributing; Engineering; Manufacturing

Founded: 1972

Staff: 75

Languages Spoken: English; French; Spanish; Chinese

Quality Environmental Management System(s): ISO

9001:2000

Products/Services/Areas of Expertise: Refrigerated cooling & pumping systems for industrial process cooling; fiberglass cooling towers for industrial process cooling & city water conservation; industrial ice makers

Financial Information:

Revenue: Greater than \$5 Million

Domestic Markets: National

Foreign Activity: Africa; Asia; Australia/New Zealand; Central America; Pacific Rim; South America; USA; Mexico

Don Berggren; President

416-755-2221, ext. 202; dberggren@berg-group.com

Dartmouth

#136, 50 Eileen Stubbs Ave.

Dartmouth, NS B3B 0M7

902-334-2630

Products/Services/Areas of Expertise: Maritime regional office

Edmonton

5325 - 47th St. NW

Edmonton, AB T6B 3T4

780-652-0988

Products/Services/Areas of Expertise: Western regional office

London

116B Newbold Ct.

London, ON N6E 1Z7

519-286-1380

Mississauga

#1, 6355 Shawson Dr.

Mississauga, ON L5T 1S7

416-755-2226

North Battleford

792 - 107th St.

North Battleford, SK S9A 4A7

306-445-7400

Products/Services/Areas of Expertise: Saskatchewan regional office

Saskatoon

111A Wheeler St.

Saskatoon, SK S7P 0A4

306-244-7400

Products/Services/Areas of Expertise: USA & Mexico regional office

Winnipeg

82 De Baets St.

Winnipeg, MB R2J 3S9

204-977-8259

Products/Services/Areas of Expertise: Midwest regional office

Best Blasting Mats Inc.

Former Name: LOB Blasting Mat; Nuroads

Environmental

2122 Algonquin Rd.

Sudbury, ON P3E 4Z6

705-561-5131

Fax: 705-522-1876

www.bestblastingmats.com

sales@bestblastingmats.com

Firm Type: Manufacturing; Scientific

Founded: 1960

Products/Services/Areas of Expertise: Manufacturing of used tires into blasting mats; specializing in traditional woven, LT, & Ultramat blasting mats; also manufacturing sidewalls, road/swamp mats, dockmats, mining mats, tire chips/aggregate (for roads, walkways, trails, etc.), and rubber parking curbs

Sturgeon Falls

Production Plant

500 Salter St.

Sturgeon Falls, ON P2B 2T1

705-753-1588

Bestobell AquaTronix

Former Name: BEP Bestobell Engineering Products

Also Known As: BEP Bestobell Ltd.

241 Norseman St.

Toronto, ON M8Z 2R5

416-231-9216

800-668-3979

Fax: 416-231-9121

www.bestobell.com

salesdesk@bestobell.com

twitter.com/bestobell

www.linkedin.com/company/bestobell-aquatronix

Firm Type: Distributing

Founded: 1953

Staff: 10

Languages Spoken: English; French

Products/Services/Areas of Expertise: The company provides industrial instrumentation & control products in areas such as pH, ORP, Sludge blanket monitoring, Turbidity, Sludge Density & Suspended solids monitoring, Dissolved Oxygen, Level, temperature, flow, pressure, steam, & leak detection.

Financial Information:

Ownership Type: Private

Revenue Sources: 100% Private Contracts

Domestic Markets: National

Nick Hribar; President

416-231-9216; nhribar@bestobell.com

Montréal

#204, 970, Montée de Liesse

Montréal, QC H4T 1W7

514-331-1225

877-331-1225

Fax: 514-331-4255

ventes@bestobell.com

Riverport

166 North Side Rd.

Riverport, NS B0J 2W0

902-766-0220

877-331-1225

Fax: 514-331-4255

dmossmann@bestobell.com

Béton Brunet 2001

Division: A division of Groupe Béton Brunet

1625, boul Monseigneur-Langlois

Salaberry-de-Valleyfield, QC J6S 1C2

450-371-8264

Fax: 450-371-4682

www.brunet.cc/SiteBB2001-E.html

info@brunet.cc

Firm Type: Manufacturing

Products/Services/Areas of Expertise: The company offers ready-mix concrete for residential, commercial, industrial & infrastructure & construction sites. Delivery & manufacturing services are provided, as well as rental of mixers & mobile plants, & technical support.

Domestic Markets: Québec

Linda Boyer; Contact

450-371-8264, ext. 2013

Bristol

89, ch de la Mine

Bristol, QC J0X 1G0

819-647-7007

877-447-7007

Fax: 819-647-2252

Daniel Lamarche; Contact

819-647-7007, ext. 2125

Kahnawake

1620, rte 207

Kahnawake, QC J0L 1B0

450-635-0110

Fax: 450-638-2733

Luc-René Chantelais; Contact

450-635-0110, ext. 2009

Labelle

10901, rte 117

Labelle, QC J0T 1H0

819-686-2181

Fax: 819-686-1592

Claude St-Louis; Contact

819-686-2181, ext. 2146

Maniwaki

379, ch de la Montagne

Maniwaki, QC J9E 1K3

819-449-3540

Fax: 819-449-3547

Louis Houle; Contact

819-449-3540, ext. 2077

Mont-Laurier

1550, boul A-Paquette

Mont-Laurier, QC J9L 1M7

819-623-3375

Fax: 819-623-5574

Ian Bilodeau; Contact

819-623-3375, ext. 2103

Nominigüe

660, rue Sainte-Anne

Nominigüe, QC J0W 1R0

819-686-2151

Fax: 819-686-1592

Claude St-Louis; Contact

819-686-2151, ext. 2146

Béton Brunet limitée

Division: A division of Groupe Béton Brunet

1625, boul Monseigneur-Langlois

Salaberry-de-Valleyfield, QC J6S 1C2

450-373-8262

800-871-1577

Fax: 450-373-3360

Other Contact: Shipping Phone: 450-373-1943

www.brunet.cc

info@brunet.cc

Firm Type: Manufacturing

Founded: 1923

Products/Services/Areas of Expertise: The company

engineered solutions for the construction industry, including piling systems, earth retention systems, anchors & nails, specially grouting & tankrepair & maintenance

Financial Information:

Revenue: Greater than \$5 Million

Domestic Markets: National

Foreign Activity: USA

Eric Drooff; President

Acton

302 Main St. North

Acton, ON L7J 1W9

519-853-3216

Fax: 519-853-5847

Calgary

235061 Wrangler Link SE

Calgary, AB T1X 0K3

403-503-0599

Fax: 403-503-0191

Edmonton

10239 - 178th St. NW

Edmonton, AB T5S 1M3

780-960-6700

Fax: 780-960-6725

Langley

#130, 9347 - 200A St.

Langley, BC V1M 3Y4

604-207-0964

Fax: 604-207-0154

Laval

1900A, rue Cunard

Laval, QC H7S 2B2

450-231-0104

Martensville

P.O. Box 2085

810 - 9th St. North

Martensville, SK S0K 2T0

306-384-3444

Fax: 306-384-3452

Regina

P.O. Box 3435

2010 Industrial Dr.

Regina, SK S4P 3J8

305-545-5050

Fax: 306-545-5058

West St. Paul

6 St Paul Blvd.

West St Paul, MB R2P 2W5

204-775-8291

Hanover, MD

US Corporate Office

#300, 7550 Teague Rd.

Hanover, MD 21076

410-551-8200

800-456-6548

Fax: 410-799-3786

Kemel Cartons Ltd.

Former Name: Kemel Cartons (1973) Ltd.

270 Partridge Ave.

Winnipeg, MB R2V 1K7

204-586-5896

Fax: 204-589-5940

kemelcartons.com

sales@kemelcartons.com

www.facebook.com/kemelcartons

Firm Type: Waste Management

Founded: 1940

Languages Spoken: English; Spanish

Products/Services/Areas of Expertise: Recycling of corrugated containers, cardboard & paper

Domestic Markets: Alberta; British Columbia; Manitoba; Saskatchewan

Foreign Activity: USA

Kemic Bioresearch Laboratories Ltd.

P.O. Box 878

Kentville, NS B4N 4H8

902-678-8195

Fax: 902-678-2839

www.kemic.com

info@kemic.com

twitter.com/KemicBio

Firm Type: Scientific

Founded: 1980

Products/Services/Areas of Expertise: Toxicology consulting

Domestic Markets: National

Foreign Activity: Western Europe; USA

Dr. Peter W. Mullen; President; pmullen@kemic.com

Kemira Water Solutions Canada Inc.

Former Name: Eaglebrook Environmental

Corporation

3405, boul Marie-Victorin

Varennes, QC J3X 1P7

800-652-0665

Fax: 450-652-7343

www.kemirawater.ca

servicecanada@kemira.com

Firm Type: Manufacturing; Waste Management

Founded: 1980

Languages Spoken: English; French; Spanish; Chinese

Products/Services/Areas of Expertise: Manufacture, sale & transport of chemicals; ferric chloride, ferric sulphate; ferrous chloride, ferroussulphate, aluminum sulphate, PHAS, PACl, PASS, ACH, polyaluminum dilatide & polyaluminum sulphate, for use in municipal & industrial wastewater treatment; applications include phosphate & BOD removal, odour control & sludge conditioning, drinkingwater treatment

Domestic Markets: National

Foreign Activity: Africa; Australia/New Zealand; Pacific Rim;

South America; USA; Mexico

Brantford

626 Oak Park Rd.

Brantford, ON N3T 5V6

519-759-7570

Fax: 519-759-8962

Ottawa

2810 Sheffield Rd.

Ottawa, ON K1B 3B9

613-746-1574

Fax: 613-746-5858

Ken Summers Biological Services

35708 Timberlane Dr.

Abbotsford, BC V3G 1G3

604-851-2300

Fax: 604-851-2300

Other Contact: Residential Phone: 604-851-2301

www3.telus.net/KSBioServ

Firm Type: Scientific

Founded: 1986

Products/Services/Areas of Expertise: Environmental consulting & contracting services; baseline studies; environmental assessments

Ken Summers, BSc., RPBio; Owner; ken.summers@telus.net

Kenaidan Contracting Ltd.

Division: A member of the Obayashi group of companies

7080 Derrycrest Dr.

Mississauga, ON L5W 0G5

905-670-2660

Fax: 905-670-9172

www.kenaidan.com

www.facebook.com/248174438541244

www.linkedin.com/company/kenaidan-contracting-ltd-

Firm Type: Management Consulting; Engineering

Founded: 1974

Products/Services/Areas of Expertise: The contracting & engineering company specializes in preconstruction/value engineering, design build & construction management.

Domestic Markets: British Columbia; Ontario

Aidan P. Flatley, BA, GSC; President & CEO

David Kirkland, BE, P.Eng, GSC; Exec. Vice-President & COO

Alysia Carter, CPA, CA, CMA; Senior Vice-President & CFO

Gian Fortuna, CET, GSC, LEED, AP; Sr. Vice-President

Preconstruction

Richmond

#240, 4311 Viking Way

Richmond, BC V6V 2K9

604-270-7670

Fax: 604-270-7612

Keneco Environmental Services Inc.

Division: A division of Codeco Energy Group

#320, 717 - 7th Ave.

Calgary, AB T2P 0Z3

403-237-8137

www.kenecoenviro.com

hr@kenecoenviro.com

www.linkedin.com/company/keneco-environmental-services-200

0-inc-

Firm Type: Management Consulting; Waste Management

Founded: 1994

Products/Services/Areas of Expertise: Site reclamation & remedial action services; environmental assessments; drilling waste management

Weyburn

102 Coteau Ave.

Weyburn, SK S4H 2Z5

306-848-1018

Kentain Products Ltd.

55 Howard Pl.

Kitchener, ON N2K 2Z4

519-576-0994

800-366-0535

Fax: 519-576-0919

www.kentain.com

info@kentain.com

Firm Type: Manufacturing

Affiliates: Water Environment Association of Ontario; American

Electroplaters & Surface Finishers Association

Founded: 1976

Staff: 5

Languages Spoken: English

Products/Services/Areas of Expertise: Manufacturer of flexible PVC, bag-type, liners for chemical storage tank & secondary containment areas

Recently Completed/Ongoing Projects: Used by Domtar

Paper, Québec; Beaver Asphalt, Montréal; & Minute Maid,

Peterborough, ON

Financial Information:

Ownership Type: Private

Revenue: \$250,000 - \$500,000

Revenue Sources: 35% Municipal; 65% Private Contracts

Domestic Markets: National

Scott Lippert; Owner; scott@kentain.com

Nathan Steffler; Technical Representative & Coordinator; na-

than@kentain.com

Wray Hussey; Head

Production; wray@kentain.com

Kernic Systems Inc.

Former Name: Kernic Equipment Sales Ltd.

5230 South Service Rd.

Burlington, ON L7L 5K2

905-632-0562

Fax: 905-632-0027

www.kernicsystems.com

Firm Type: Manufacturing; Waste Management; Recycling

Founded: 1978

Languages Spoken: English

Products/Services/Areas of Expertise: Manufacturer of balers, shredders & pneumatic air systems; recycling system for printers, envelope manufacturer, folding carton & corrugated box, industries; waste paper recycling systems

Financial Information:

Ownership Type: Private

Revenue Sources: 100% Private Contracts

Domestic Markets: National

Foreign Activity: Africa; Central America; South America; USA

Jason Hineman; President; sales@kernicsystems.com

John Jurk; Vice-President; jjurk@kernicsystems.com

Kerr Wood Leidal Associates Ltd./KWL

#200, 4185A Still Creek Dr.

Burnaby, BC V5C 6G9

604-294-2088

Fax: 604-294-2090

www.kwl.ca

mail@kwl.ca

Firm Type: Management Consulting; Engineering

Affiliates: Association of Consulting Engineers of Canada;

Association of Consulting Engineers of British Columbia

Founded: 1975

Staff: 40

Products/Services/Areas of Expertise: Plans & designs municipal watersystems; water source selection; water treatment evaluations; water audits; seismic assessments

Domestic Markets: British Columbia

Mark S. Blamey; President