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International Trade in Environmental and Clean Technology Products by Origin and Destination, 2007 to 2017

by Marco Provenzano, Jack Wang and Ian Donegan

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International Trade in Environmental and Clean Technology Products by Origin and Destination, 2007 to 2017

by **Marco Provenzano, Jack Wang and Ian Donegan**

1. Introduction

This report presents annual estimates of international exports and imports of environmental and clean technology products from 2007 to 2017 by region and country of origin and destination. The federal budget 2017 provided funding for a period of four years starting in 2017-18 to develop the Clean Technology Data Strategy, including funding for the ongoing production and enhancements of the Environmental and Clean Technology Products Economic Account (ECTPEA). This study is part of the work related to this initiative.

Throughout the paper, environmental and clean technology products, which include merchandise (goods) and services, will be referred to as ECT products. The data are consistent with those presented in the ECTPEA, although minor differences may arise due to revisions in the international trade data. The ECTPEA quantifies the size and scope of environmental and clean technology activity in the Canadian economy and is an important component of the measurement for the sector (Appendix A1).

Several tables and a summary of findings are included in this document. However, in many cases, more detailed data are available on the destinations, origins and commodity breakdown of exports and imports.

It should be noted that all merchandise trade data in this report are on a custom basis rather than a balance of payments (BOP) basis. As such, normal Canadian System of Macroeconomic Accounts adjustments for freight and timing as well as certain valuation adjustments have not been applied. Moreover, provincial detail reflects province of clearance rather than production and final destination.

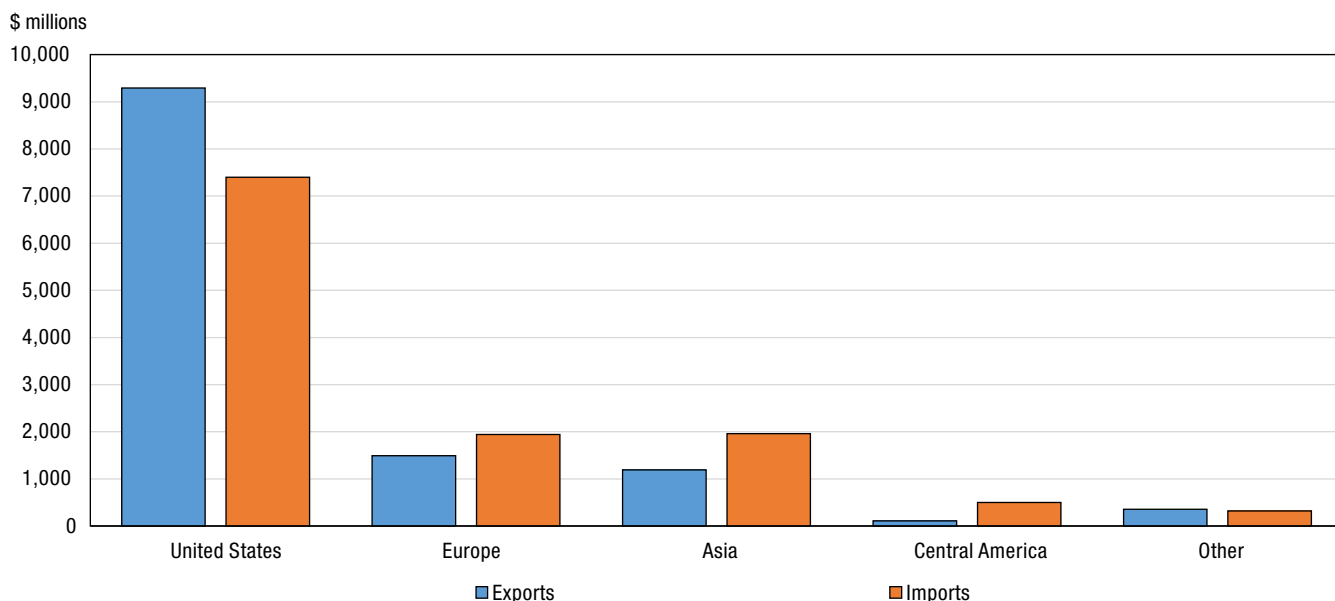
2. Results

International trade in environmental and clean technology (ECT) products has increased strongly over the past 10 years, with exports rising from \$8.3 billion¹ in 2007 to \$12.4 billion in 2017, a 49.6% increase, compared with 23.3% growth in exports for the overall economy. Imports also rose over the same period, from \$6.6 billion to \$12.1 billion, an increase of 83.2%. Imports for the overall economy advanced 41.1%. With electricity and waste products excluded, total exports reached \$6.6 billion while total imports were \$10.2 billion in 2017. With this exclusion, exports grew 87.9% from 2007, while imports increased by 132.4% over the same period.

In 2017, Canada had a \$312 million trade surplus in ECT products compared with a \$48.8 billion trade deficit for the overall economy. A surplus indicates that Canada exported more to a region than it imported. The trade deficit in ECT products for Canada was \$3.6 billion when excluding electricity and waste products. By international region, Canada had a \$1.9 billion trade surplus in ECT products with the United States and a trade deficit with most other regions. Trade deficits with Europe and Asia, the two largest markets for ECT products after the United States, amounted to \$470 million and \$755 million respectively.

1. All numbers are in current dollars (i.e. not adjusted for price effects).

Chart 1
Canadian trade in environmental and clean technology products, by regions of the world, 2017

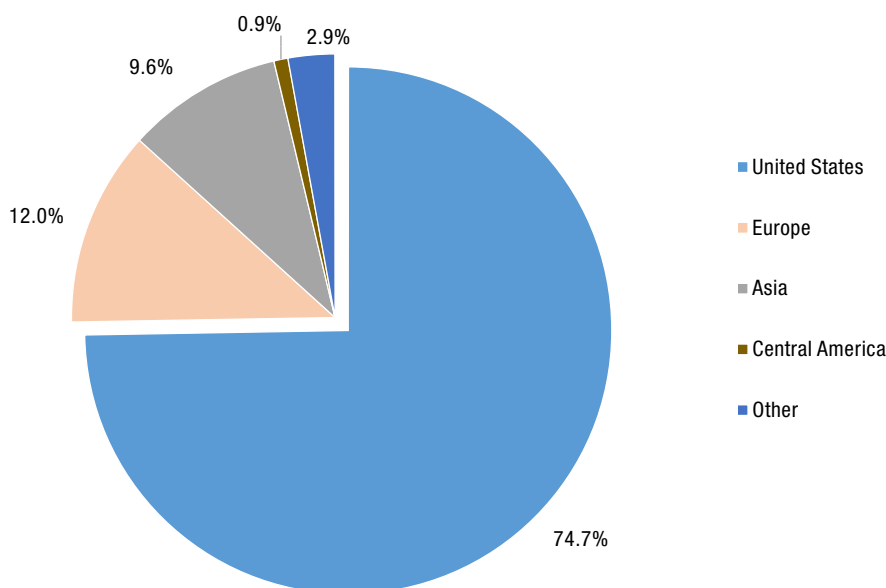


Sources: Statistics Canada, International Merchandise Trade Database; Statistics Canada, Balance of Payments special tabulations.

2.1 Exports

Exports of ECT products from Canada grew steadily from \$8.3 billion in 2007 to \$12.4 billion in 2017 for an increase of 49.6%. The majority of the value of Canadian exports of ECT products were destined for the United States, 74.7% in 2017. In the same year, 12.0% of ECT exports were shipped to Europe and 9.6% to Asia. Central American countries received approximately 0.9% of Canadian environmental products exports, with all other regions receiving 2.9%.

Chart 2
Share of Canadian environmental and clean technology products exports, by region of destination, 2017



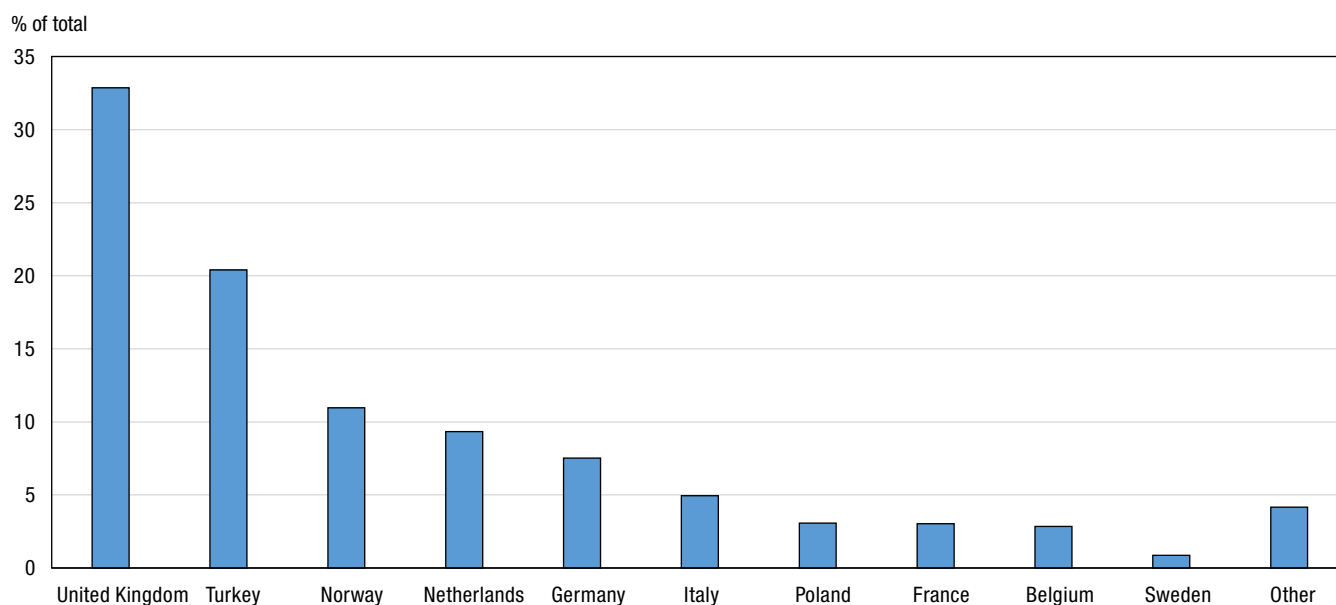
Sources: Statistics Canada, International Merchandise Trade Database; Statistics Canada, Balance of Payments special tabulations.

In 2017, importers from the United States received \$6.3 billion in ECT goods, a further \$2.2 billion in re-usable waste products and \$783 million in ECT services for a total of \$9.3 billion. The largest single environmental and clean technology export to the United States was electricity, totalling \$2.3 billion in 2017. Waste and scrap of iron and steel reached \$1.0 billion while waste and scrap of non-ferrous metals totalled \$945 million. Other than electricity and waste, the next largest exports were heavy fuel oils from clean sources and chemical products such as biofuels totalling \$907 million in 2017.

European importers received \$827 million in environmental goods, \$406 million in re-usable waste products and \$257 million in environmental services for a total \$1.5 billion in 2017. Environmental and clean technology exports to Europe were predominately destined to a handful of countries, with over 80% of merchandise² exports heading to just 5 countries. Merchandise exports include only goods (not services) and are derived from customs-based trade data.

The United Kingdom was the biggest European export market for ECT products, receiving \$406 million in goods and re-usable waste products, or 32.9% of total ECT merchandise exports to Europe. Turkey was the second largest European export market. The rest of the top 5 importers in 2017 were Norway, the Netherlands and Germany.

Chart 3
Distribution of Canadian environmental and clean technology merchandise exports to European countries, 2017



Source: Statistics Canada, International Merchandise Trade Database.

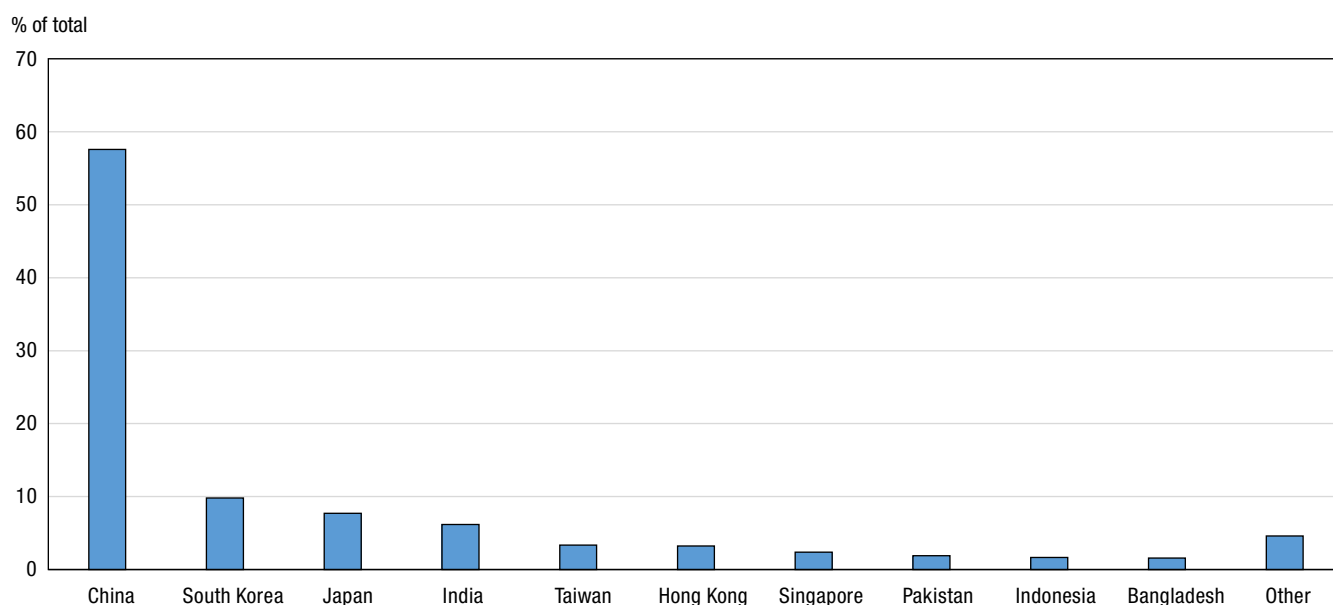
The majority of ECT merchandise exports to the United Kingdom in 2017 consisted of waste and scrap of wood and wood by-products (\$265 million)³, mostly wood pellets. The second largest export to the United Kingdom were self-propelled work trucks powered by an electric motor (\$79 million). The main exports to the Turkish market were waste and scrap of iron and steel (\$214 million) and wood chips (\$20 million).

Asian importers received \$358 million in ECT goods from Canada, \$772 million in re-usable waste and \$58 million in services for a total of \$1.2 billion in 2017. The majority of these exports were to mainland China, which received 57.6% of ECT merchandise exports to Asia. These exports were mainly re-usable waste, coming from non-ferrous metals (\$259 million), from paper and paperboard (\$202 million) and from iron and steel (\$73 million). South Korea and Japan were the second and third largest markets in Asia in 2017.

2. For country detail, service exports and imports are excluded as the data is not of sufficient quality.

3. Wood waste is considered a good rather than waste as it can be directly burned for fuel (ex. wood pellets).

Chart 4
Distribution of Canadian environmental and clean technology merchandise exports to Asian countries, 2017

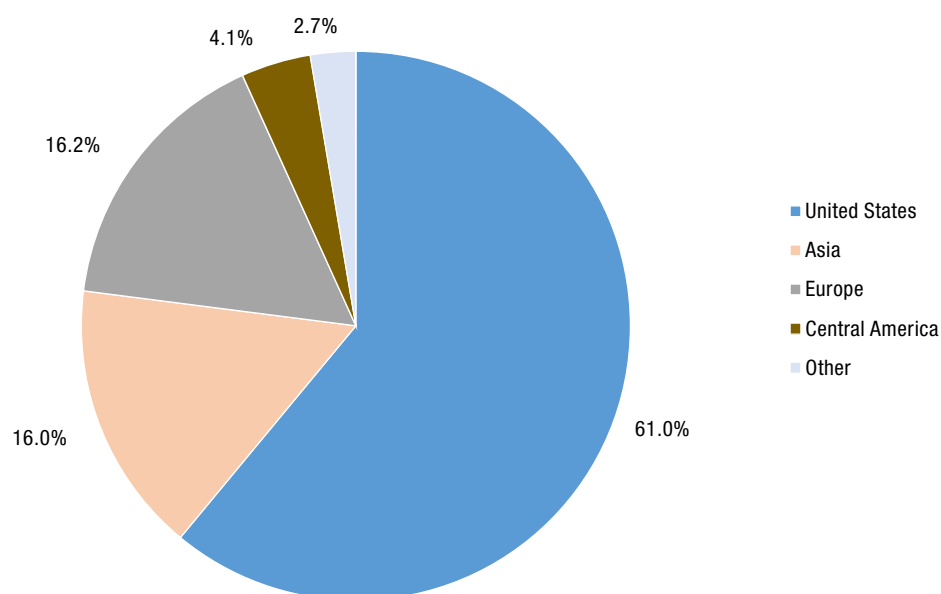


Source: Statistics Canada, International Merchandise Trade Database.

2.2 Imports

Imports of ECT products into Canada grew steadily from \$6.6 billion in 2007 to \$12.1 billion in 2017 for an increase of 83.2%. The majority of the imports came from the United States with \$7.4 billion being traded in 2017, representing 61.0% of the total imports. Other major regions for import of ECT products were Europe with 16.2%, Asia with 16.0% and Central America with 4.1% in 2017, while all other regions accounted for 2.7%.

Chart 5
Share of Canadian environmental and clean technology products imports by region of origin, 2017



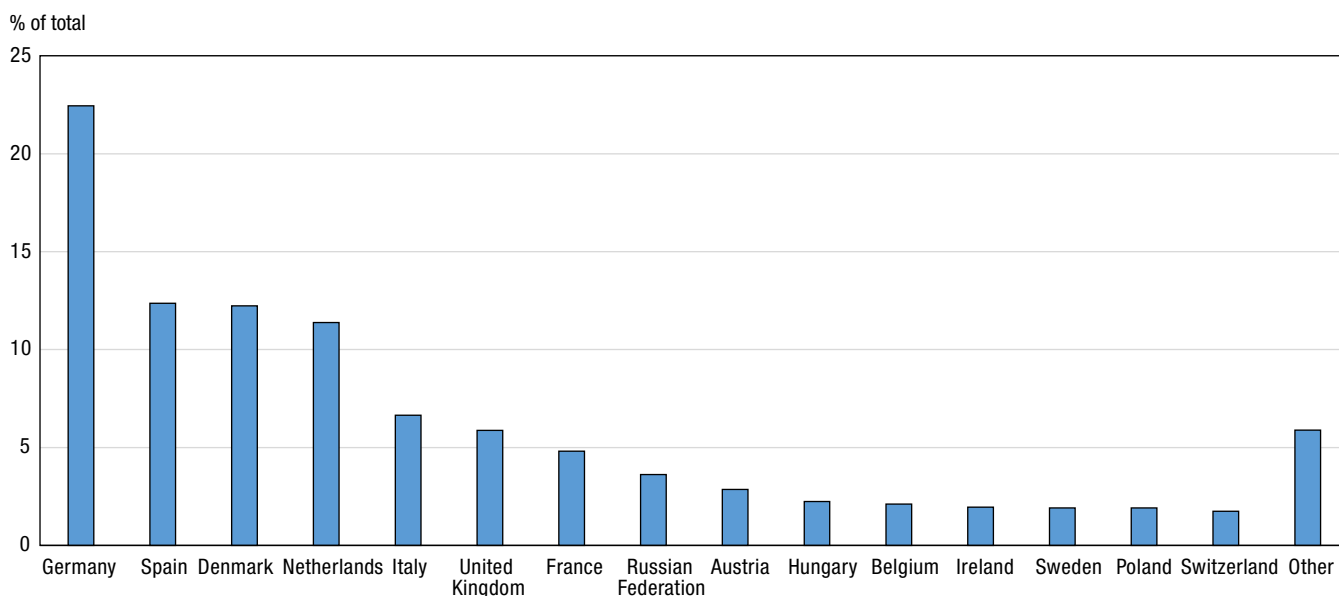
Sources: Statistics Canada, International Merchandise Trade Database; Statistics Canada, Balance of Payments special tabulations.

Of the \$7.4 billion imported from the United States in 2017, goods (excluding waste products) accounted for \$5.3 billion, re-usable waste consisted of \$1.1 billion and services contributed the remaining \$966 million. The largest ECT merchandise imports from the United States were other basic organic chemicals, with ethanol (\$769 million) being the main contributor. Other leading import categories of goods were electric motors and generators (\$530 million) followed by chemical products not elsewhere classified, which includes biodiesel (\$468 million). Waste and scrap of non-ferrous metals totalled \$721 million in 2017.

The total imports of ECT goods and re-usable waste from Europe into Canada totalled \$1.7 billion in 2017, with ECT services adding an additional \$264 million. The main contributing imports from this region were turbines and turbine generator set units (\$443 million).

By country, Germany had the most merchandise exports to Canada valued at \$381 million in 2017, with the country's main exports being transformers and electric motors and generators (\$80 million each). Spain, Denmark and the Netherlands followed. Imports from these three countries have increased significantly from their historical levels, which can be attributed to wind-powered electric generating sets from Spain and Denmark and biodiesel from the Netherlands.

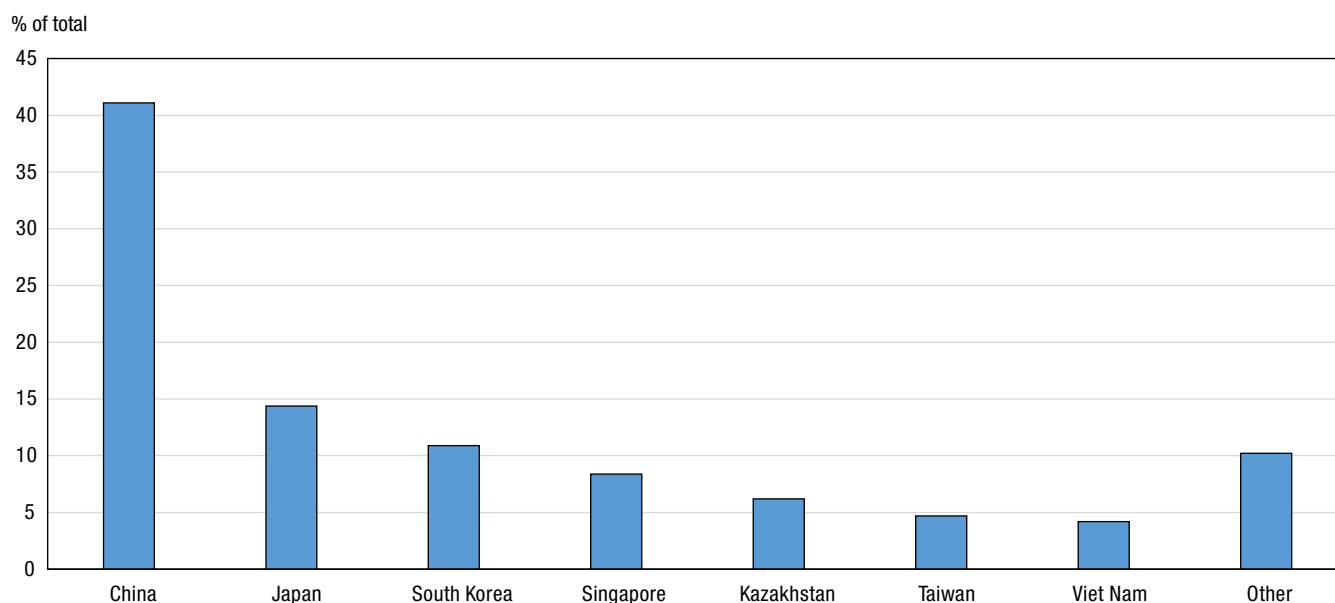
Chart 6
Distribution of Canadian environmental and clean technology merchandise imports from European countries, 2017



Source: Statistics Canada, International Merchandise Trade Database.

Canada's imports of goods and reusable waste from Asia has been steady for the past few years and totalled \$1.9 billion in 2017. Environmental services from the region accounted for an additional \$87 million. China made up 41.1% of total merchandise imports, with the main imported commodities being electric motors and generators (\$214 million) and printed and integrated circuits (\$177 million) mainly used in solar panel production. Other major Asian exporters include Japan, South Korea and Singapore. A significant percentage of the imports from Japan were made up of waste and scrap of non-ferrous metals (\$73 million) such as scrap gold jewellery (\$70 million). The second and third largest imports from Japan were printed and integrated circuits (\$46 million) and electric motors and generators (\$44 million).

Chart 7
Distribution of Canadian environmental and clean technology merchandise imports from Asian countries, 2017



Source: Statistics Canada, International Merchandise Trade Database.

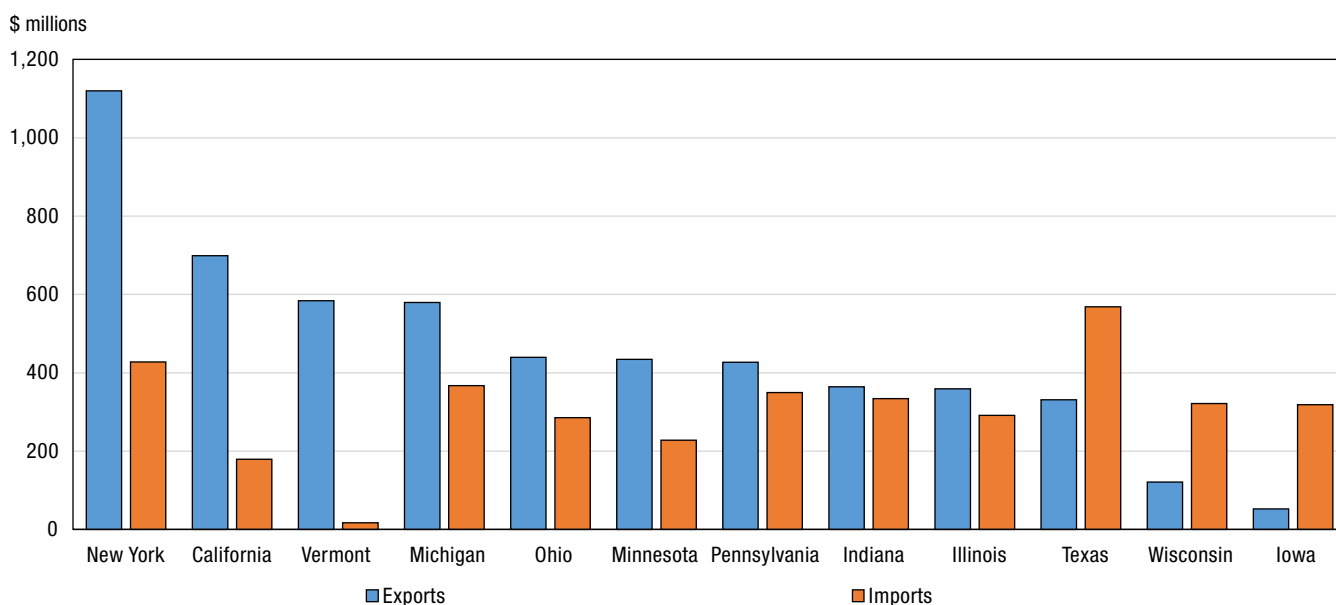
2.3 Merchandise Trade with the United States by State⁴

Total Canadian ECT merchandise exports to the United States were \$8.5 billion in 2017, with a distribution of \$6.3 billion in goods and \$2.2 billion in reusable waste. The top goods exported to the U.S. were electricity (\$2.3 billion), waste and scrap of iron and steel (\$1 billion), waste and scrap of non-ferrous metals (\$945 million) and heavy fuel oils from clean sources (\$583 million). Canadian merchandise exports to the U.S. were \$4.0 billion in 2017 with the exclusion of electricity and waste products.

For Canadian ECT merchandise imports from the United States, a total of \$6.4 billion was traded with a distribution of \$5.3 billion in goods and \$1.1 billion in reusable waste. With the exclusion of electricity and waste, imports totalled \$5.1 billion. The top imports of merchandise goods were other basic organic chemicals such as ethanol (\$770 million), waste and scrap of non-ferrous metals (\$721 million), electric motors and generators (\$530 million) and chemical products not elsewhere classified such as biodiesel (\$516 million).

4. For country detail, service exports and imports are excluded as the sub-region breakdown is not of sufficient quality. For the United States, only merchandise trade has a state of origin / destination identifier.

Chart 8
Canadian environmental and clean technology merchandise trade with the United States, by selected state, 2017



Source: Statistics Canada, International Merchandise Trade Database.

For Canadian ECT merchandise exports to the U.S., New York was the largest destination with \$1.1 billion in 2017 which represented 13.2% of the total. The states proceeding New York were California, Vermont, Michigan and Ohio. The largest single commodity being shipped to New York was electricity, which totalled \$447 million in 2017. Exports to California consist almost entirely of goods (98.9%) with electricity being the largest single commodity being shipped to the state. Vermont imported mainly electricity from Canada comprising 92.9% of the state's total. Michigan had a more even distribution between goods and re-usable waste with \$398 million or 68.6% being goods and the rest being mainly composed of waste and scrap of iron and steel and of non-ferrous metals.

Canadian ECT imports from the U.S. came from most states, with the largest contributors being the states of Texas, New York and Michigan. For Texas, the majority of its exports to Canada consisted of clean energy products such as ethanol (\$130 million) and biodiesel (\$120 million). In New York, the largest non-waste commodity was material handling equipment (\$63 million). Michigan's largest non-waste exports to Canada were other motor vehicle parts for environmental protection (\$93 million) and electric motors and generators (\$28 million).

2.4 Merchandise⁵ Trade by Province

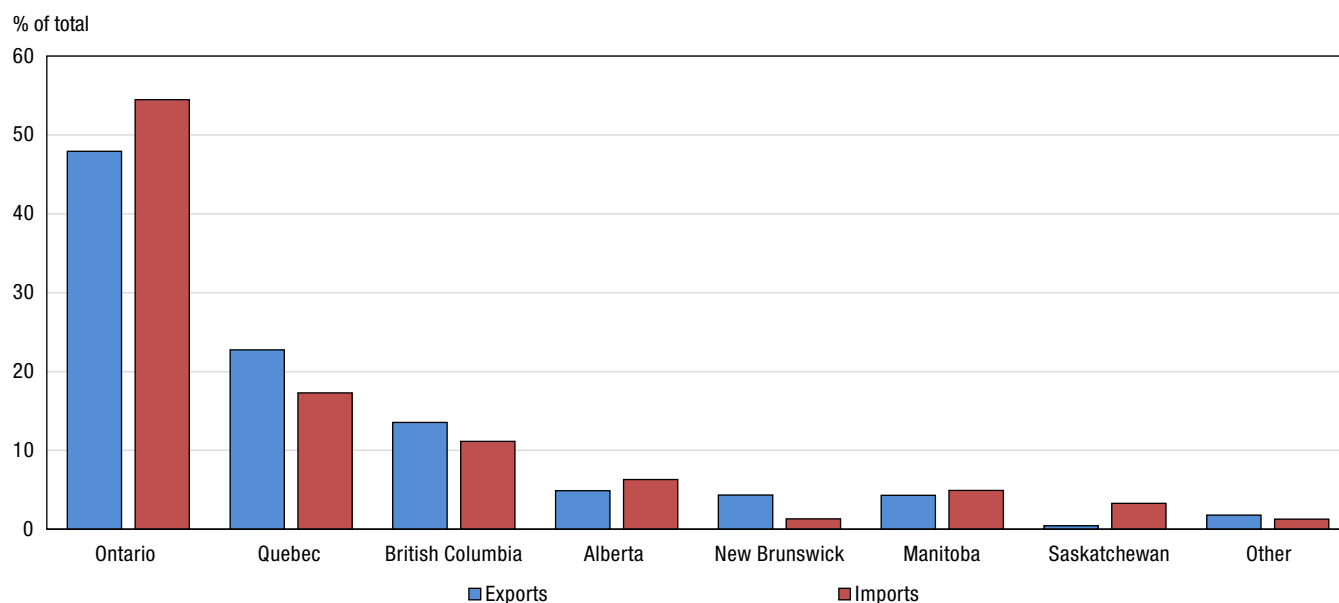
This section provides details on trade data by origin and destination using customs based sources. It should be noted that balance of payments adjustments for freight and other adjustments will not be included. Additionally, customs based data uses the port of exit or entry and does not reflect the province of production, which may be different. Published macroeconomic account data for provinces is however, based on production and differences may exist in this analysis for these reasons.

Nearly half of all environmental and clean technology merchandise exports in 2017 exited Canada from Ontario (47.9%). Quebec accounted for 22.7% of merchandise exports while British Columbia made up 13.5%. Alberta, New Brunswick and Manitoba exported between 4.3% and 4.9% in 2017. Exports originating in Nova Scotia made up 1.4% of the total while all other provinces and territories made up less than 1.0%. Excluding electricity and waste, Ontario had the majority of merchandise exports from Canada with 57.6% of the total, with Quebec and British Columbia at 15.5% and 11.1% respectively.

5. For country detail, service exports and imports are excluded as the sub-region breakdown is not of sufficient quality.

Conversely, over half of all environmental and clean technology merchandise imports in 2017 entered Canada through Ontario⁶ (54.5%). Similar to exports, Quebec and British Columbia were the next largest import markets for ECT products. In 2017, 17.3% of these products were cleared through Quebec while 11.2% were cleared through British Columbia. Alberta, Manitoba and Saskatchewan received 6.3%, 4.9% and 3.3% respectively of ECT products in 2017. Imports destined to New Brunswick accounted for 1.3% of total ECT imports, while Nova Scotia comprised 0.9%. Newfoundland, Prince Edward Island and the three territories accounted for less than 0.5% of total merchandise imports. The exclusion of electricity and waste resulted in a similar distribution of the total by each province.

Chart 9
Share of total Canadian environmental and clean technology merchandise trade, by province, 2017



Source: Statistics Canada, International Merchandise Trade Database.

2.5 Services Trade

In 2017, total annual exports and imports of ECT services reached \$1.2 billion and \$1.4 billion respectively. Excluding waste management, exports and imports of ECT services were \$1.1 billion and \$1.0 billion respectively. The main trading partner for both imports and exports of ECT services with Canada was the United States which accounted for 64.8% of Canada's total exports and 71.2% of total imports in 2017.

The top three exports of services to the United States⁷ in 2017 consisted of research and development, management and administrative services associated with ECT, and environmental services, which consists primarily of sanitation, waste storage, waste management services, and environmental consulting and audits.

The top three imports of services from the United States in 2017 were environmental services, patents and industrial design, as well management and administrative services associated with clean technology.

6. This value represents the province of clearance, and may not be the same as the province of final destination. For example, imports cleared in Ontario may be destined to other provinces.

7. Unallocated services, averaging less than 1% of the total, were allocated to each region using the share of the allocated portion.

Table 1
Canadian annual trade of environmental and clean technology services, by world region

	2011	2012	2013	2014	2015	2016	2017
	\$ millions						
Exports	1,026	1,101	1,144	1,148	1,211	1,149	1,209
United States	669	665	733	717	799	744	783
Europe	205	188	215	249	234	245	258
Asia	52	74	69	67	63	55	58
Other	100	174	127	115	115	105	110
Imports	1,004	1,070	1,203	1,305	1,427	1,331	1,357
United States	752	793	881	922	1031	947	966
Europe	172	185	213	258	272	259	264
Asia	56	59	74	93	91	86	87
Other	24	33	35	32	33	39	40

Source: Statistics Canada, Balance of Payments special tabulations.

Table 2
Canadian annual trade of environmental and clean technology services, excluding waste management services, by world region

	2011	2012	2013	2014	2015	2016	2017
	\$ millions						
Exports	800	842	977	1,030	990	1,036	1,087
United States	474	505	595	604	625	652	683
Europe	195	171	217	246	208	233	244
Asia	48	51	61	66	61	55	57
Other	83	115	104	114	96	96	103
Imports	640	722	798	856	988	975	984
United States	448	505	540	537	660	672	678
Europe	119	132	157	201	214	191	193
Asia	51	53	68	87	84	79	80
Other	22	32	33	31	30	33	33

Source: Statistics Canada, Balance of Payments special tabulations.

3. Data Sources

Several major sources of data were used in this report to define and measure environmental and clean technology (ECT) exports and imports. Information used to identify ECT products included international merchandise trade data⁸, the intergovernmental taxonomy of ECT products, the Doha classification for clean technology products and Eurostat documentation of Environmental Goods and Services. Data sources for the measurement of ECT trade included international merchandise trade data for goods and Balance of Payments (BOP) based data on services. The Annual Electricity Supply and Disposition Survey as well as supplementary material from the International Scrap Trade database were also used.

3.1 Goods

All customs-based trade in goods are classified according to the Harmonized Commodity Description and Coding System (HS). The HS is an international classification system that is used to classify the import and export of goods⁹. Customs declarations are only used to record the import and export of goods and are not used to record the import and export of services. Goods are tracked as exports, re-exports¹⁰ and imports. Exports and re-exports are combined to form a single export category. Imports are reported separately.

8. The international trade data originated from Canadian and US customs declarations which include detailed information about the commodity being imported and exported, its value, the country of origin and destination and the quantity traded. The goods are classified according to the Harmonized Commodity Description and Coding System (HS).

9. In Canada, imported goods are assigned a HS10 code and exported goods are assigned a HS8 code. These codes aggregate to HS6, HS4 and HS2 levels. Data are collected by the Canada Border Services Agency (CBSA) and submitted to Statistics Canada for use in producing international merchandise trade statistics. Since the HS codes are used for outlining tariff schedules, the more detailed level of classification can be identified with its more aggregate definitions. For example, HS 8 - 38260000 Biodiesel is part of HS 4 - 3826 Biodiesel which is part of HS 2 - 38 Miscellaneous Chemical products.

10. Re-exports consist of the export of goods that were previously imported.

3.2 Services

Services are derived from quarterly and annual international trade in service business surveys. These services are included in import and export flows presented in this report.

3.3 Other Sources

Some goods such as electricity are available through the Annual Electricity Supply and Disposition Survey. While there is also an HS code for electricity, the survey data are used to generate ratios for clean technology (section 4.2) as well as a secondary data source in addition to the trade data. The Statistics Canada Supply Use Tables were also referenced to fill data gaps not covered by other existing sources. It also provided supplementary coverage for ratio development.

4. Methodology

4.1 Identifying ECT Products

The first step in calculating the origins and destinations of ECT exports and imports was to identify which products should be considered to be environmental or clean technology products. This process was established while producing the ECTPEA and this study used the same product list.

4.1.1 Goods

Working with subject matter experts from Natural Resources Canada (NRCAN), Innovation, Science and Economic Development Canada (ISED) and Global Affairs Canada (GAC), Statistics Canada started by separating commodities into ECT and non-ECT categories. Using various sources, such as Statistics Canada's previously established Intergovernmental Clean Technology Taxonomy, Canada's submission to the Doha trade round on clean technology and GAC research, commodities which had no ECT content and those that contained some proportion of ECT content were determined.

This methodology yielded a list of 401 HS8 codes expected to contain environmental and clean technology exports. The identification of ECT trade series focused on the export (HS8) level. Once these series were selected, they were matched to HS10 import trade series using an internal concordance at Statistics Canada. In most cases there was a one to one match between HS8 and HS10, but in certain cases several HS10 categories were matched to one HS8 series. This assumed that all HS10 codes that matched an HS8 code took the same proportion of environmental and clean technology intensity that was assigned at the HS8 level. This exercise led to the identification of 828 HS10 import codes.

4.1.2 Waste

In the case of waste products, extensive work was undertaken to determine whether they should be included or excluded from environmental and clean technology products. While typically waste does not have any value, there is extensive trade of waste metals and other scraps where the 'waste' can either be sent for re-processing into a useable good, or valuable materials can be extracted from waste and reused in the production process. Since the definition of environmental and clean technology includes resource management (Appendix A1), it was determined that waste products that had a monetary value and were traded, primarily for recycling into useable goods or for the extraction of materials, were in scope for the ECTPEA.

4.1.3 Services

While HS codes cover goods, there is also trade in clean technology services. Clean technology services would include waste management and remediation, environmental disaster response services, clean construction and architectural services among others. Using the taxonomy as a guide, these services were identified using Statistics Canada's BOP system, which provides import and export data on all traded services. Similarly to the HS process,

all BOP services were investigated and the services identified as containing environmental and clean technology activities were selected. International trade in services are categorized according to the international Extended Balance of Payments Classification System (EBOPS).

4.2 Development of ECT Ratios

Once the import and export series were identified, they were assigned ratios that represent the intensity of environmental and clean technology in each category. Despite the detailed classification of products in the HS system, many are not fully used for environmental and clean technology. For example, a product like chlorine has a variety of non-ECT uses, but is a component of water treatment. While 100% of chlorine is not used for environmental and clean technology, some proportion of it is, requiring the development of ratios for all products whose proportion of ECT activity is between 0% and 100%.

Ratios are derived from a variety of sources. One important source is the input ratio that can be derived from the Statistics Canada Supply Use Tables. Some ratios have specific sources such as the proportion of clean electricity being derived from Statistics Canada's Annual Electricity Supply and Disposition Survey. Finally, other ratios are calculated by matching series to the Supply Use Commodity Classification (SUCC) codes and determining the proportion of activity in a corresponding industry. For example, the amount of concrete products used in electric power engineering construction (for hydroelectric dams) among other industries was used to determine the 'environmental and clean technology' ratio for concrete.

For HS code ratios assigned at the HS8 level, it was assumed that the proportion of environmental and clean technology at the import level was identical to the proportion at the export level.

For certain products a separate survey or administrative data were available. In these cases, ratios could be derived directly from the survey source.

This exercise was initially completed for the year 2012. The same method was then used to calculate ratios for the years 2007 to 2017. Resulting ratios were then used to derive environmental and clean technology trade estimates by applying them to trade flows for the series identified as containing environmental and clean technology.

4.3 Classification Systems

Trade data for goods and services are compiled using the Harmonized System (HS) for goods and according to Balance of Payments (BOP) categories for services. While the data were processed and analyzed in their original state, they are aligned to the SUCC system for integration into the ECTPEA. The results for this report are therefore presented using SUCC to align with the final ECTPEA results, however, HS categories are also shown to provide added detail where appropriate.

4.4 Origin and Destination Breakdown

Customs records used in compiling the HS dataset at Statistics Canada provide a vast amount of data on each transaction. For the purpose of this paper, the country of destination, US state of destination and province of origin and clearance are used to assign the trade data by region.

Services data, compiled from Statistics Canada's BOP survey, were also assigned a country of origin and destination.

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Appendix

A1 Environmental and Clean Technology Products Economic Account

The Environmental and Clean Technology Products Economic Account (ECTPEA) measures the economic contribution of environmental and clean technology products in terms of output, gross domestic product (GDP), employment (number of jobs), international trade and other economic variables. Estimates are directly comparable with national results for the Canadian economy. It is developed within the framework of the Canadian System of Macroeconomic Accounts (CSMA). As such, estimates are directly comparable to macroeconomic aggregates such as gross domestic product (GDP) and international trade.

Environmental and clean technology is defined as any process, product, or service that reduces environmental impacts: through environmental protection activities that prevent, reduce or eliminate pollution or any other degradation of the environment, resource management activities that result in the more efficient use of natural resources, thus safeguarding against their depletion; or the use of goods that have been adapted to be significantly less energy or resource intensive than the industry standard.

As part of the Government of Canada's initiative to develop a Clean Technology Data Strategy, the ECTPEA provides comprehensive measures of the supply and use of environmental and clean technology products in Canada's economy. The ECTPEA has a broader scope than the Survey of Environmental Goods and Services (SEGS) and captures economy-wide transactions in the environmental and clean technology sector, including elements such as clean energy and scrap metals. The government and non-profit sectors are also fully covered in the ECTPEA.

The compilation of the ECTPEA draws on a variety of data sources, including Statistics Canada's Supply Use Tables, detailed import and export statistics released in Canada's Balance of Payments and SEGS.

Examples of environmental goods and services and clean technologies are available in the publication: *Clean technologies and the Survey of Environmental Goods and Services: A technical reference guide* (Catalogue number 16-511-X).

A2 Selected Data Tables

Table A2.1

Canadian environmental and clean technology trade (merchandise and services), by world region

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
	\$ millions										
Exports											
United states	6,336	7,439	5,860	5,775	6,465	6,799	7,485	8,705	8,592	8,620	9,293
Europe	758	1,036	914	919	1,309	1,077	1,181	1,215	1,109	1,334	1,491
Asia	806	795	914	884	993	1,059	1,001	1,002	1,039	1,106	1,188
Central america	37	53	81	50	50	59	66	60	51	47	107
Middle east	65	59	87	64	51	68	62	87	86	76	82
South america	91	56	53	60	175	100	113	86	87	74	79
Africa	85	139	199	218	220	170	204	143	54	54	73
Other	135	117	125	129	95	136	120	89	93	114	121
Total	8,312	9,695	8,233	8,100	9,358	9,468	10,233	11,386	11,111	11,427	12,434
Imports											
United states	4,931	5,802	4,831	5,328	5,970	6,008	6,232	7,157	7,122	6,637	7,396
Asia	553	593	738	1,026	1,375	1,549	1,548	1,800	1,972	1,880	1,943
Europe	617	1,301	1,259	1,530	1,276	1,359	1,598	1,563	1,651	1,508	1,962
Central america	218	240	208	274	305	388	419	433	488	521	499
Oceania	10	14	12	11	45	68	86	58	86	112	90
South america	109	96	124	54	36	56	62	59	64	62	73
Middle east	5	11	23	16	82	36	18	23	37	28	53
Other	174	88	109	68	107	107	74	95	83	103	106
Total	6,616	8,145	7,302	8,307	9,198	9,572	10,036	11,188	11,504	10,852	12,122

Sources: Statistics Canada, International Merchandise Trade Database and Statistics Canada, Balance of Payments special tabulations.

Table A2.2
Canadian environmental and clean technology merchandise trade, by world region

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
	\$ millions										
Exports											
United states	5,789	6,815	5,302	5,171	5,796	6,134	6,752	7,988	7,793	7,876	8,510
Goods	4,446	5,200	4,247	3,645	3,874	4,263	5,027	6,012	6,229	6,296	6,334
Waste	1,343	1,615	1,056	1,526	1,922	1,870	1,725	1,977	1,564	1,581	2,176
Europe	597	836	729	740	1,104	889	966	966	875	1,089	1,234
Goods	318	533	600	601	704	685	814	796	730	906	827
Waste	280	303	129	139	399	203	152	170	145	183	406
Asia	749	744	873	840	941	985	932	935	976	1,051	1,130
Goods	146	179	341	238	267	270	257	290	284	359	358
Waste	603	565	532	602	675	715	676	645	692	691	772
Central america	24	42	69	36	36	41	48	40	34	31	90
Goods	23	41	67	36	36	40	47	40	34	30	25
Waste	0	1	2	0	1	1	1	0	0	1	65
Middle east	39	45	72	47	40	50	48	71	68	65	71
Goods	37	45	71	45	37	49	47	69	68	64	69
Waste	2	1	1	1	2	2	1	2	0	1	2
South america	50	37	40	46	161	71	95	67	66	57	60
Goods	42	32	37	43	159	69	93	65	64	56	59
Waste	8	4	3	3	2	1	2	2	1	1	1
Africa	34	104	161	181	196	121	178	130	43	38	56
Goods	25	28	87	37	61	31	34	25	24	35	40
Waste	9	76	74	144	135	90	144	105	19	3	16
Other	47	63	46	75	58	76	70	41	45	71	76
Goods	45	61	45	74	57	55	68	39	43	69	73
Waste	2	2	1	2	2	20	2	2	2	1	2
Total	7,329	8,686	7,292	7,137	8,332	8,366	9,089	10,238	9,900	10,278	11,225
Imports											
United states	4,344	5,120	4,115	4,624	5,218	5,215	5,351	6,234	6,091	5,689	6,430
Goods	3,177	3,607	3,241	3,589	4,016	4,280	4,623	5,344	5,274	4,899	5,306
Waste	1,167	1,513	874	1,035	1,202	936	728	890	818	790	1,124
Asia	491	543	688	972	1,319	1,490	1,474	1,707	1,882	1,794	1,855
Goods	474	528	684	966	1,314	1,485	1,469	1,697	1,868	1,707	1,772
Waste	17	15	4	6	5	5	5	9	13	87	83
Europe	487	1,157	1,101	1,361	1,104	1,174	1,385	1,305	1,378	1,249	1,697
Goods	444	1,074	1,044	1,342	1,052	1,120	1,324	1,279	1,360	1,230	1,658
Waste	43	83	57	19	52	55	61	26	18	19	39
Central america	217	239	206	269	304	384	406	426	480	513	490
Goods	217	237	204	253	294	374	405	426	479	512	485
Waste	1	2	2	16	9	9	0	0	0	1	5
Oceania	3	5	4	5	37	58	78	51	78	103	81
Goods	3	3	4	5	5	5	6	6	7	9	7
Waste	0	3	0	0	32	53	72	44	71	94	74
South america	107	94	116	50	33	51	56	54	61	59	70
Goods	104	77	63	44	30	49	52	49	57	53	67
Waste	3	17	53	5	3	3	4	5	4	5	3
Middle east	3	10	20	13	80	35	16	20	33	24	49
Goods	3	9	16	11	78	35	15	18	32	24	36
Waste	1	1	4	2	2	0	0	2	1	0	13
Other	152	80	100	55	100	95	69	87	74	89	92
Goods	142	57	80	43	91	89	57	76	66	79	78
Waste	10	23	19	12	9	7	12	10	8	10	13
Total	5,804	7,249	6,350	7,348	8,194	8,502	8,833	9,883	10,077	9,520	10,764

Source: Statistics Canada, International Merchandise Trade Database.

Table A2.3
Canadian environmental and clean technology services trade, by world region

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
	\$ millions										
Exports											
United states	547	624	558	604	669	665	733	717	799	744	783
Europe	160	200	184	179	205	188	215	249	234	245	258
Asia	58	51	41	44	52	74	69	67	63	55	58
Antilles	68	43	69	46	24	40	26	31	35	28	30
South america	41	19	13	14	14	29	18	20	21	17	18
Africa	51	35	38	37	24	48	26	12	11	16	17
Central america	13	12	13	14	13	18	18	19	17	16	17
Other	46	25	25	25	25	37	39	33	31	26	28
Total	984	1,009	941	963	1,026	1,101	1,144	1,148	1,211	1,149	1,209
Imports											
United states	587	682	716	704	752	793	881	922	1031	947	966
Europe	130	144	157	169	172	185	213	258	272	259	264
Asia	62	50	50	54	56	59	74	93	91	86	87
Antilles	4	4	4	2	3	2	2	3	3	9	9
South america	2	2	8	4	4	5	6	5	4	3	3
Africa	4	4	4	8	3	5	4	4	5	4	4
Central america	1	1	2	5	2	4	13	7	8	8	9
Other	22	10	11	11	12	17	10	13	13	14	14
Total	812	896	952	958	1,004	1,070	1,203	1,305	1,427	1,331	1,357

Source: Statistics Canada, Balance of Payments special tabulations.

Table A2.4
Top Canadian environmental and clean technology merchandise trade, per supply use commodity classification, by world region

	2014	2015	2016	2017
	\$ millions			
Exports				
United states	7,988	7,793	7,876	8,510
Goods	6,012	6,229	6,296	6,334
ENE221100 - Electricity	2,316	2,466	2,291	2,308
ENE324115 - Heavy fuel oils	1,020	621	578	583
MPG325900 - Chemical products, n.e.c.	271	206	452	324
MPG335301 - Power, distribution and other transformers	266	360	329	318
MPG333902 - Material handling equipment	243	305	276	309
MPG333909 - Other miscellaneous general-purpose machinery	221	241	275	269
MPG335302 - Electric motors and generators	226	246	267	260
MPG334401 - Printed and integrated circuits, semiconductors and printed circuit assemblies	120	331	304	250
MPG333401 - Industrial and commercial fans, blowers and air purification equipment	191	182	175	205
MPG332A05 - Other architectural metal products	102	141	184	191
Waste	1,977	1,564	1,581	2,176
MPG331X01 - Waste and scrap of iron and steel	1,125	732	711	1,024
MPG331X02 - Waste and scrap of non-ferrous metals	726	692	717	945
MPG322X00 - Waste and scrap of paper and paperboard	115	128	143	198
MPG326X00 - Waste and scrap of plastic and rubber	5	7	7	7
MPG331404 - Other unwrought non-ferrous metals including alloys	5	5	3	2
Europe	966	875	1,089	1,234
Goods	796	730	906	827
MPG321X00 - Waste and scrap of wood and wood by-products	204	205	313	294
ENE324115 - Heavy fuel oils	252	170	196	110
MPG333902 - Material handling equipment	50	45	62	83
MPG333909 - Other miscellaneous general-purpose machinery	46	57	80	76
MPG333601 - Turbines, turbine generators, and turbine generator sets	59	56	68	63
MPG335302 - Electric motors and generators	45	41	36	47
MPG334401 - Printed and integrated circuits, semiconductors and printed circuit assemblies	24	41	36	36
MPG321103 - Wood chips	19	27	26	22
MPG333401 - Industrial and commercial fans, blowers and air purification equipment	26	20	18	15
MPG335303 - Switchgear, switchboards, relays and industrial control apparatus	12	13	13	13
Waste	170	145	183	406
MPG331X01 - Waste and scrap of iron and steel	130	95	102	227
MPG331X02 - Waste and scrap of non-ferrous metals	37	47	76	175
MPG322X00 - Waste and scrap of paper and paperboard	3	2	4	4
MPG331404 - Other unwrought non-ferrous metals including alloys	0	1	1	0
Asia	935	976	1,051	1,130
Goods	290	284	359	358
MPG321X00 - Waste and scrap of wood and wood by-products	34	23	54	53
MPG335302 - Electric motors and generators	14	23	35	48
MPG333902 - Material handling equipment	8	7	23	34
MPG333909 - Other miscellaneous general-purpose machinery	22	22	24	27
MPG334401 - Printed and integrated circuits, semiconductors and printed circuit assemblies	21	28	26	26
MPG336111 - Passenger cars	11	0	30	21
MPG333401 - Industrial and commercial fans, blowers and air purification equipment	17	23	14	20
MPG333601 - Turbines, turbine generators, and turbine generator sets	34	25	34	18
ENE324115 - Heavy fuel oils	20	15	15	16
MPG333300 - Commercial and service industry machinery	13	15	15	15
Waste	645	692	691	772
MPG331X02 - Waste and scrap of non-ferrous metals	304	313	255	331
MPG322X00 - Waste and scrap of paper and paperboard	171	225	249	248
MPG331X01 - Waste and scrap of iron and steel	156	143	179	185
MPG326X00 - Waste and scrap of plastic and rubber	6	7	6	5
MPG331404 - Other unwrought non-ferrous metals including alloys	7	5	2	2

Table A2.4
Top Canadian environmental and clean technology merchandise trade, per supply use commodity classification, by world region

	2014	2015	2016	2017
	\$ millions			
Imports				
United states	6,234	6,091	5,689	6,430
Goods	5,344	5,274	4,899	5,306
MPG325105 - Other basic organic chemicals	884	759	748	770
MPG335302 - Electric motors and generators	528	511	498	530
MPG325900 - Chemical products not elsewhere classified	330	347	308	516
MPG333902 - Material handling equipment	234	299	293	311
MPG336390 - Other motor vehicle parts	241	277	311	293
ENE324111 - Gasoline	145	204	212	235
MPG333909 - Other miscellaneous general-purpose machinery	199	200	201	196
MPG327A02 - Glass and glass products	144	183	190	196
ENE221100 - Electricity	489	241	202	189
MPG333401 - Industrial and commercial fans and blowers, and air purification equipment	172	179	185	187
Waste	890	818	790	1,124
MPG331X02 - Waste and scrap of non-ferrous metals	488	521	504	721
MPG331X01 - Waste and scrap of iron and steel	273	164	134	203
MPG322X00 - Waste and scrap of paper and paperboard	120	124	143	191
MPG326X00 - Waste and scrap of plastic and rubber	9	10	9	8
Asia	1,707	1,882	1,794	1,855
Goods	1,697	1,868	1,707	1,772
MPG334401 - Printed and integrated circuits, semiconductors and printed circuit assemblies	542	563	465	456
MPG335302 - Electric motors and generators	348	429	350	364
MPG325900 - Chemical products not elsewhere classified	197	127	120	141
ENE324111 - Gasoline	52	123	16	117
MPG335301 - Transformers	106	68	60	71
MPG335901 - Batteries	34	44	47	55
MPG335204 - Major appliances	36	37	43	54
MPG334409 - Other electronic components	14	17	17	47
MPG333909 - Other miscellaneous general-purpose machinery	37	84	87	43
MPG333300 - Commercial and service industry machinery	31	33	39	42
Waste	9	13	87	83
MPG331X02 - Waste and scrap of non-ferrous metals	4	8	81	74
MPG331404 - Other refined non-ferrous metals and non-ferrous metal alloys	3	3	4	6
MPG331406 - Basic non-ferrous metal products (except aluminum)	2	2	1	1
MPG331X01 - Waste and scrap of iron and steel	0	0	0	1
Europe	1,305	1,378	1,249	1,697
Goods	1,279	1,360	1,230	1,658
MPG333601 - Turbines and turbine generator set units	406	501	175	443
MPG335302 - Electric motors and generators	198	228	238	229
ENE324111 - Gasoline	65	106	96	158
MPG335301 - Transformers	103	58	140	138
MPG325900 - Chemical products not elsewhere classified	91	13	47	135
MPG333909 - Other miscellaneous general-purpose machinery	66	56	73	76
MPG334409 - Other electronic components	33	22	50	47
MPG333300 - Commercial and service industry machinery	42	34	40	42
MPG333902 - Material handling equipment	25	35	35	40
MPG333401 - Industrial and commercial fans and blowers, and air purification equipment	31	31	53	38
Waste	26	18	19	39
MPG331X02 - Waste and scrap of non-ferrous metals	25	15	17	37
MPG331404 - Other refined non-ferrous metals and non-ferrous metal alloys	1	2	1	1
MPG326X00 - Waste and scrap of plastic and rubber	0	0	0	1

Source: Statistics Canada, International Merchandise Trade Database.

Table A2.5
Canadian environmental and clean technology merchandise trade, excluding electricity and waste, by world region

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
\$ millions											
Exports											
United states	2,161	2,331	2,412	2,114	2,320	2,763	3,105	3,696	3,763	4,004	4,025
Europe	318	533	600	601	704	685	814	796	730	906	827
Asia	146	179	341	238	267	270	257	290	284	359	358
Middle east	37	45	71	45	37	49	47	69	68	64	69
South america	42	32	37	43	159	69	93	65	64	56	59
Africa	25	28	87	37	61	31	34	25	24	35	40
Antilles	29	46	21	43	23	31	45	12	12	44	39
Other	39	56	91	67	69	64	70	68	64	56	60
Total	2,797	3,250	3,659	3,187	3,640	3,964	4,465	5,019	5,010	5,524	5,477
Imports											
United states	2,446	2,597	2,744	3,096	3,733	4,099	4,334	4,855	5,033	4,697	5,116
Asia	474	528	684	966	1,314	1,485	1,469	1,697	1,868	1,707	1,772
Europe	444	1,074	1,044	1,342	1,052	1,120	1,324	1,279	1,360	1,230	1,658
Central america	217	237	204	253	294	374	405	426	479	512	485
South america	104	77	63	44	30	49	52	49	57	53	67
Middle east	3	9	16	11	78	35	15	18	32	24	36
Africa	133	45	50	15	18	17	13	14	19	23	14
Other	12	15	35	33	78	76	50	68	54	66	72
Total	3,832	4,582	4,839	5,761	6,597	7,254	7,663	8,406	8,903	8,312	9,220

Source: Statistics Canada, Balance of Payments special tabulations.

Table A2.6
Canadian environmental and clean technology services trade, excluding waste management services, by world region

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
\$ millions											
Export											
United states	381	467	452	423	466	500	588	594	625	652	683
Europe	138	183	172	170	192	169	214	242	208	233	244
Asia	31	37	35	40	47	50	60	65	61	55	57
Antilles	55	33	67	45	23	35	24	30	35	28	29
South america	19	11	11	11	11	18	14	19	19	16	17
Central america	12	10	12	13	12	15	15	18	15	15	16
Middle east	15	9	14	16	10	10	11	16	8	10	10
Other	45	45	46	51	39	45	50	45	19	28	29
Total	695	795	809	768	800	842	977	1,030	990	1,036	1,087
Imports											
United states	373	425	447	422	447	507	539	536	660	672	678
Europe	94	93	107	118	119	132	157	201	214	191	193
Asia	57	43	44	49	51	54	68	86	84	79	80
Oceania	7	8	8	6	8	10	8	7	8	9	9
Central america	1	1	2	5	2	4	13	7	8	8	9
Africa	4	3	3	8	2	4	3	4	4	4	4
South america	2	2	8	4	4	5	6	5	3	3	3
Other	19	8	8	8	8	7	5	10	7	8	8
Total	558	583	627	619	640	722	798	856	988	975	984

Source: Statistics Canada, Balance of Payments special tabulations.