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# Physical Flow Accounting

## UNSD SEEA Training of Trainers Seminar

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# **“Beyond GDP”**

*“...we often draw inferences about what are good policies by looking at what policies have promoted economic growth; but if our metrics of performance are flawed, so too may be the inferences that we draw.”*

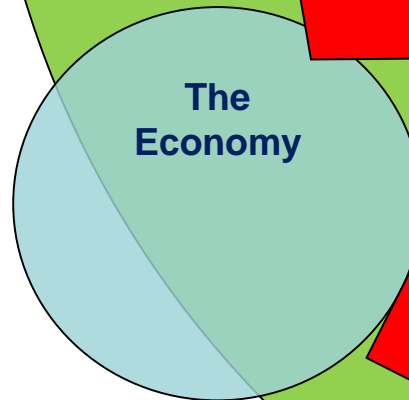
Stiglitz, J.E., A. Sen, and J-P. Fitoussi, (2009), Report by the Commission on the Measurement of Economic Performance and Social Progress, p.7  
[www.stiglitz-sen-fitoussi.fr/documents/rapport\\_anglais.pdf](http://www.stiglitz-sen-fitoussi.fr/documents/rapport_anglais.pdf)

# The Economy and The Environment

Stocks

Flows

Expenditures



-Natural Resources  
-Ecosystem Services

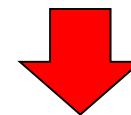
-Residuals

# System of Environmental-Economic Accounts (SEEA) view

|             | Industries  | Final demand  | Assets   |  |  |
|-------------|---|---|--|--|--|
| Sectors     |   |   | Financial and produced assets, opening balance                                     | Natural resource assets, opening balance                       | Natural resource assets, opening balance |
| Commodities | Industrial output of goods and services                                 |   |  |  |  |
|             | Industrial intermediate demand<br>Environmental protection expenditures | Final demand<br>Environmental protection expenditures                       | Gross fixed capital formation<br>Capital expenditures for environmental protection |  |  |
|             | Resource production by industries<br>Resource use by industries         | Resource production by households/gov't<br>Resource use by households/gov't |  |  |  |
| Wastes      | Waste consumption by industries<br>Waste output by industries           | Waste consumption by households/gov't<br>Waste output by households/gov't   |  |  |  |
| Sectors     |   |   | Other changes in volume & holding gains/losses on financial & produced assets      | Changes in and holding gains/losses on natural resource assets | Changes in natural resource assets       |
|             |   |   | Financial and produced assets, closing balance                                     | Natural resource assets, closing balance                       | Natural resource assets, closing balance |

# Flow Accounting

Table 3.2.1 General physical supply and use table



## Supply table

|                | Production; Generation of residuals   |   | Accumulation  | Flows from the rest of the world             | Flows from the environment                                       | Total                                 |
|----------------|---|---|---|--|--|---------------------------------------|
|                | Production; Generation of residuals by industries (incl. household production on own account) - classified by ISIC        | Generation of residuals by households                 | Industries - classified by ISIC   |  |  |                                       |
| Natural inputs |   |   |   |  | A. Flows from the environment (incl. natural resource residuals) | Total Supply of Natural Inputs (TSNI) |
| Products       | C. Output (incl. sale of recycled and reused products)  |   |   | D. Imports of products                       |  | Total Supply of Products (TSP)        |
| Residuals      | I1. Residuals generated by industry (incl. natural resource residuals)<br><br>I2. Residuals generated following treatment | J. Residuals generated by household final consumption | K1. Residuals from scrapping and demolition of produced<br>K2. Emissions from controlled landfill sites | L. Residuals received from rest of the world | M. Residuals recovered from the environment                      | Total Supply of Residuals (TSR)       |
| Total supply   |   |   |   |  |  |                                       |


# Flow Accounting



| Use table      |  |   |   |  |  |                                    |
|----------------|--|---|---|--|--|------------------------------------|
|                | Intermediate consumption of products; Use of natural inputs; Collection of residuals                   | Final consumption*  | Accumulation  | Flows to the rest of the world             | Flows to the environment   | Total                              |
|                | Industries - classified by ISIC  | Households  | Industries - classified by ISIC                                 |  |  |                                    |
| Natural inputs | B. Extraction of natural inputs<br>B1. Extraction used in production<br>B2. Natural resource residuals |   |   |  |  | Total Use of Natural Inputs (TUNI) |
| Products       | E. Intermediate consumption (incl. purchase of recycled and reused products)                           | F. Household final consumption (incl. purchase of recycled and reused products) | G. Gross Capital Formation (incl. fixed assets and inventories) | H. Exports of products                     |  | Total Use of Products (TUP)        |
| Residuals      | N. Collection and treatment of residuals (excl. accumulation in controlled landfill sites)             |   | O. Accumulation of waste in controlled landfill sites           | P. Residuals sent to the rest of the world | Q. Residual flows to the environment<br><br>Q1. Direct from industry and households (incl. natural resource residuals & landfill emissions)<br>Q2. Following treatment | Total Use of Residuals (TUR)       |
| Total use      |  |   |   |  |  |                                    |

\*No entries for government final consumption are recorded in physical terms. All government intermediate consumption, production and generation of residuals is recorded against the relevant industry in the first column of the PSUT.

# Energy Flow Accounting



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Gouvernement du Canada

ICN

|

Services


|

Departments

|

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Table 153-0032<sup>1, 2, 3</sup>

Energy use, by sector

annual (terajoules)

Data table

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The data below is a part of CANSIM table 153-0032. Use the [Add/Remove data](#) tab to customize your table.

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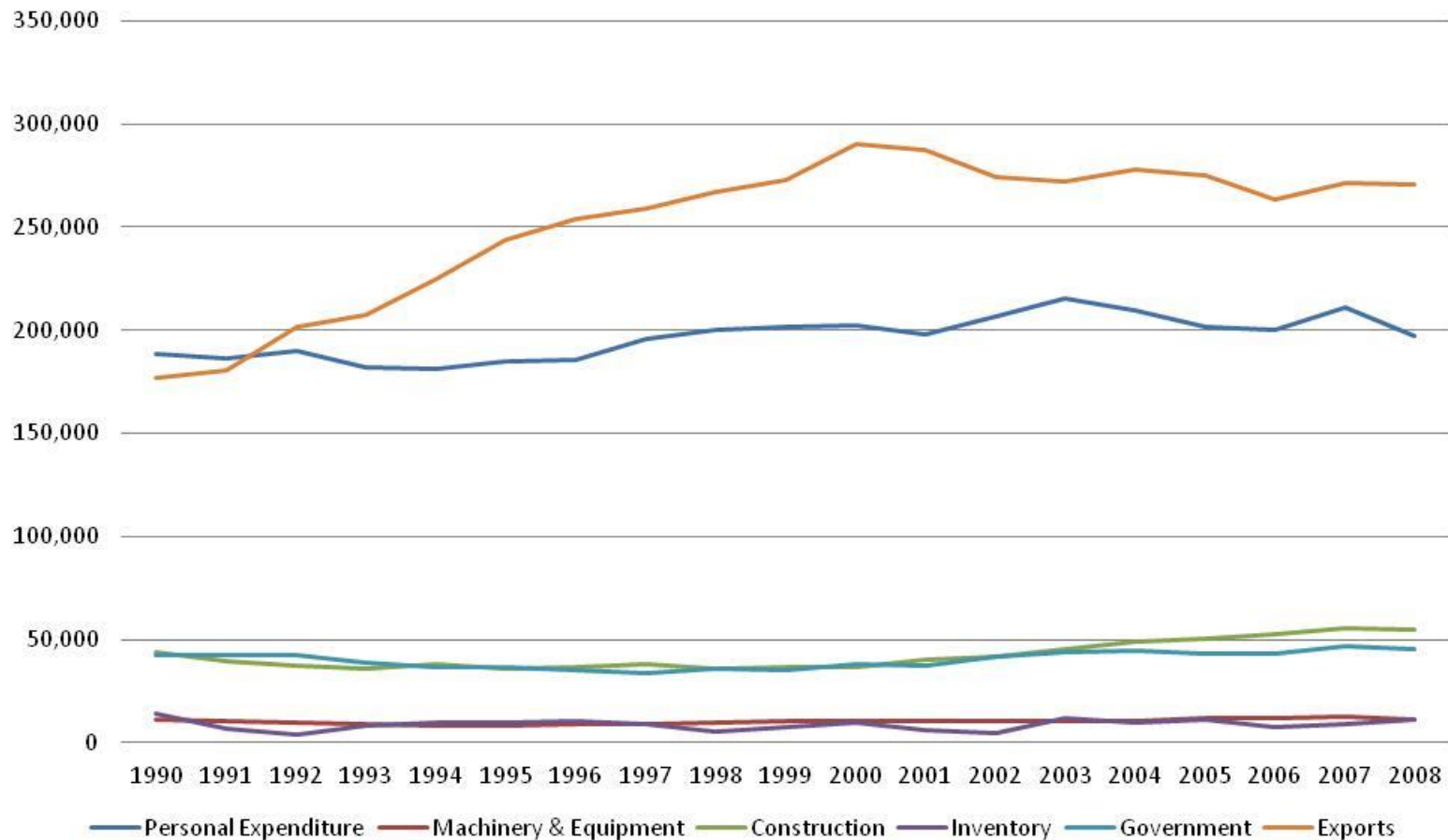
Geography = Canada

| Sector   | 2004       | 2005       | 2006       | 2007       | 2008       |
|--|------------|------------|------------|------------|------------|
| Total, all sectors                                       | 10,498,742 | 10,470,903 | 10,226,701 | 10,840,945 | 10,612,484 |
| Business sector  | 7,658,424  | 7,632,322  | 7,442,237  | 7,851,631  | 7,649,385  |
| Crop and animal production                               | 177,363    | 169,023    | 162,585    | 177,368    | 174,849    |
| Forestry and logging                                     | 41,144     | 44,839     | 38,362     | 31,051     | 30,369     |
| Fishing, hunting and trapping                            | 16,950     | 13,492     | 11,351     | 11,196     | 11,118     |
| Support activities for agriculture and forestry          | 13,468     | 15,955     | 14,049     | 15,295     | 15,837     |
| Oil and gas extraction                                   | 1,074,476  | 1,112,942  | 1,052,099  | 1,104,403  | 1,096,012  |
| Coal mining  | 17,916     | 14,919     | 12,498     | 14,162     | 17,921     |
| Metal ore mining   | 70,269     | 74,533     | 74,584     | 70,172     | 82,056     |
| Non-metallic mineral mining and quarrying                | 55,270     | 53,045     | 58,387     | 58,604     | 58,858     |
| Support activities for mining and oil and gas extraction | 54,195     | 61,830     | 68,896     | 63,791     | 61,170     |
| Electric power generation, transmission and distribution | 1,611,069  | 1,623,420  | 1,515,911  | 1,666,580  | 1,657,178  |



# Residuals Flow Accounting

Industrial emissions by final demand category





# Demand-based perspectives

## Goods and services purchases resulting in the highest indirect emissions from households, 2004<sup>P</sup>

|  | Emissions <sup>1</sup> | Contribution to total household indirect emissions | Personal expenditure <sup>2</sup> | Contribution to total spending | Emissions intensity <sup>3</sup>   |
|--|------------------------|--|-----------------------------------|--------------------------------|------------------------------------|
|  | kilotonnes             | percent  | millions of dollars               | percent                        | kilotonnes per millions of dollars |
| <b>Personal expenditure categories of final demand<sup>4</sup></b> |                        |  |                                   |                                |                                    |
| Electricity  | 41,445                 | 20   | 13,570                            | 2                              | 3.054                              |
| Food and non-alcoholic beverage                                    | 39,857                 | 19   | 67,105                            | 9                              | 0.594                              |
| Restaurants and accommodation services                             | 15,716                 | 8  | 49,505                            | 7                              | 0.317                              |
| Motor fuels and lubricants   | 15,137                 | 7  | 24,245                            | 3                              | 0.624                              |
| <b>Subtotal</b>  | <b>112,155</b>         | <b>54</b>  | <b>154,425</b>                    | <b>21</b>                      | <b>...</b>                         |

1. Domestic industrial emissions associated with producing goods and services to meet household demand.

2. Household spending on consumer goods and services, plus the operating expenses of private non-profit organizations serving households.

3. Domestic industrial emissions per unit of total personal expenditure.

4. Final demand in the Canadian System of National Accounts (CSNA) is broken down into 170 categories, 52 of which are related to personal expenditure by individuals, families and private non-profit organizations. Each of the 719 goods and services in the CSNA is assigned to one of these 52 broad categories of personal expenditure.

### Source(s):

Environment Accounts and Statistics Division, Material and Energy Flow Accounts, 2008.

Statistics Canada, CANSIM table 380-0024, accessed November 12, 2008.

# Questions?

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