Preliminary Resource Recovery Report Card and Gaps Assessment for Canada

Summary - June 2020

The full report was prepared by:

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This summary was prepared by NRCan

Natural Resources Canada | Ressources naturelles Canada

Purpose

- To **estimate** the recovery and recycling tonnage for selected materials in Canada, using data from published/available sources.
- To include a **gap analysis** and **assessment** for future work needed to refine the preliminary estimates and collect additional data to fill in identified information gaps.
- To undertake this assignment, **Kelleher Environmental** was contracted by NRCan (Lands and Minerals Sector and the Canadian Forest Service).

Primary data sources

- NRCan – LMS and CFS (contacts, trade data, etc.)
- Statistics Canada (WMIS)
- ECCC studies (plastics, CR&D)
- Standing Committee on Natural Resources
- Industry associations
- Extended Producer Responsibility entities
- Recycling companies, councils and associations
- Journals, miscellaneous reports, studies and articles
- Internet research, etc.

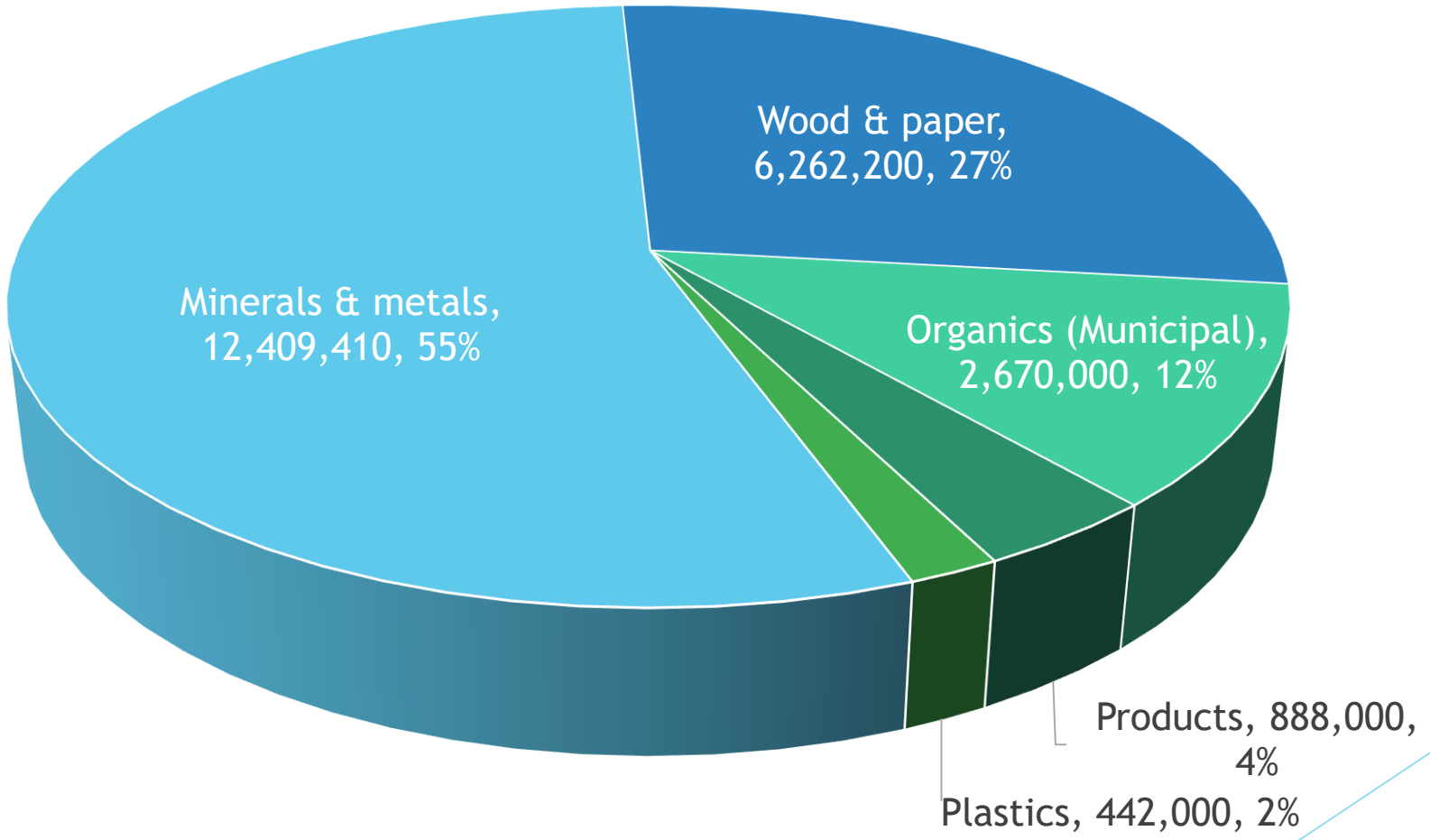
Scope

Materials — Paper, ferrous metals, non-ferrous metals, glass, plastics, food and yard waste, lumber, wood and drywall (typical recyclables)

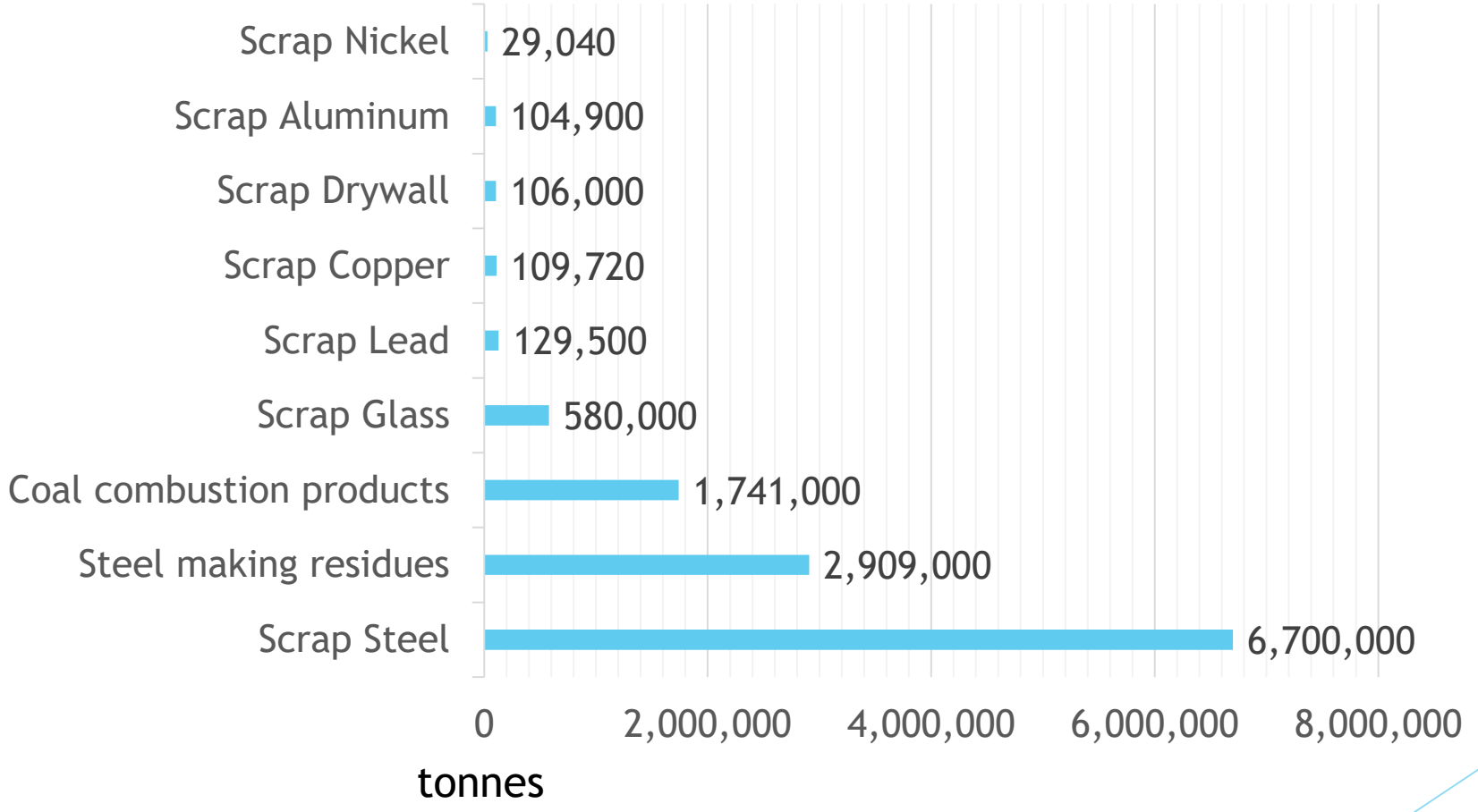
Products — Auto hulks, tires, electronics, appliances and batteries that are typically recycled to recover metals and plastics (EPR targets)

Industrial residuals — Coal combustion products (CCP), steel making residuals, wood ash, and foundry sand

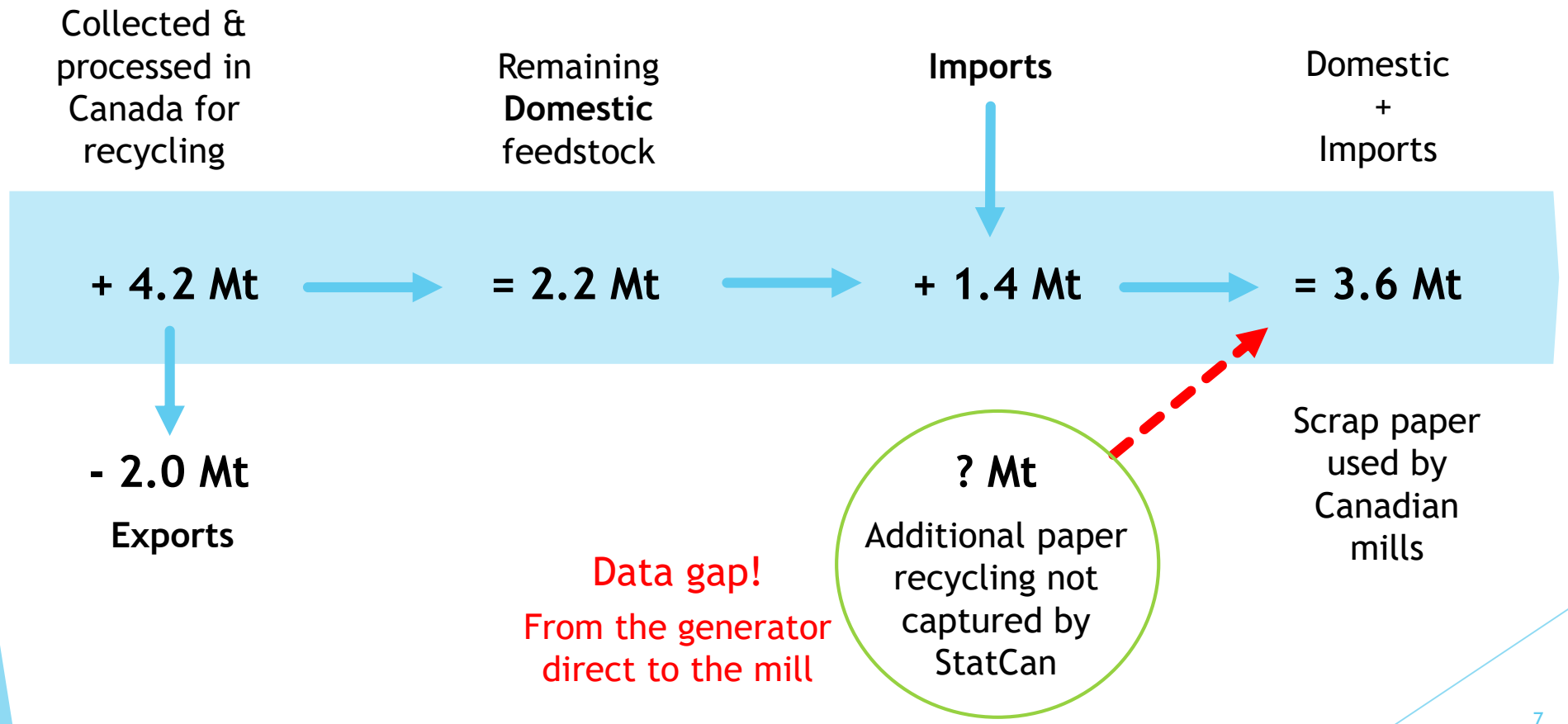
Selected materials & products recovered
(22.7 million tonnes/year – 2018 baseline)



Minerals & metals recovered
(2018 estimate, 12.4 million tonnes)



Paper recovered
(2018 estimate, 3.6 million tonnes)



Lumber and wood recovered
(2018 estimate, 2.56 million tonnes)

Three general sources:

- Construction, renovation and demolition (CR&D) activities;
- Wood pallets (logistics/shippers); and,
- Forest product industry residuals.

Management options for wood waste include:

- Reuse;
- Recycle into other products such as mulch, animal bedding, etc.; and,
- Use as a biofuel.

Wood Waste Source Recycled or Reused	Tonnes/Year
CR&D activities	283,000
Wood pallets	272,000
Industry (mill) residuals	2,000,000
Total for Canada	**2,555,000**

- CCME report (Kelleher 2015)
- 14.8 M pallets recycled
- 364 biofuel facilities

Wood ash
(2018 under-estimate, 107,200 tonnes)

Characteristics	Data
▶ Created when tree tops and branches, bark, wood chips, and sawdust are burned to produce bioenergy (often used to power P&P mills). ▶ More biofuel industry = more wood ash ▶ Excellent source of lime, potassium and many trace elements that promote plant growth. ▶ Other beneficial purposes include soil stabilization, road stabilization, solidification of waste, and as a neutralizing (liming) agent.	▶ ~1 million tonnes/year (IEA Bioenergy, 2018) ▶ 420,000 t/y in 2013 (Cherian & Siddiqua, 2019). ▶ 107,200 t/y (boiler ash from Canadian P&P mills, 2013) ▶ Many gaps and data uncertainties ▶ Double-counting concerns

Plastics recovered
(2016 estimate, 442,000 tonnes)

Sector/Source of Plastic Waste	Discarded (Tonnes)	Recovered (Tonnes)
Packaging	1,542,000	327,000
Electronic and Electrical Equipment	214,000	33,000
Agriculture	45,000	5,000
Automotive	309,000	-
White goods	130,000	7,000
Construction	175,000	11,000
Textile	235,000	17,000
Other plastics	617,000	43,000
Total for Canada	**3,268,000**	**442,000**

(For ECCC, by Deloitte and Cheminfo, 2019)

Selected end-of-life products

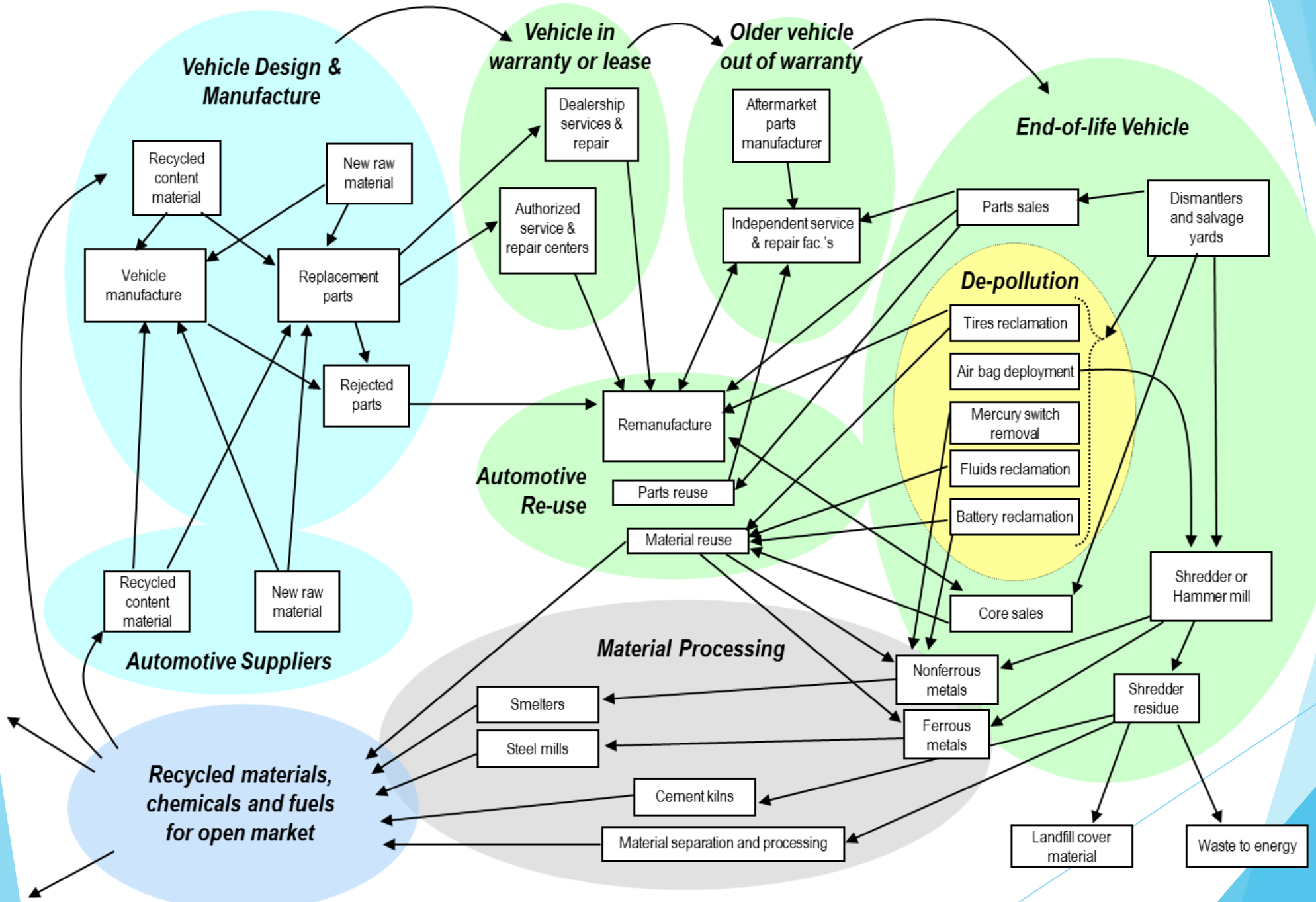
- Auto Hulks
- Tires
- Electronic Waste
- Large Appliances (White Goods)
- Small Appliances (BC EPR program)
- Batteries (Lead Acid and Small/Consumer)

Auto hulks (or vehicles)

About 1.6 million vehicles are scrapped each year in Canada. Assume average weight per vehicle is 1,818 kg = 2.9 million t/y

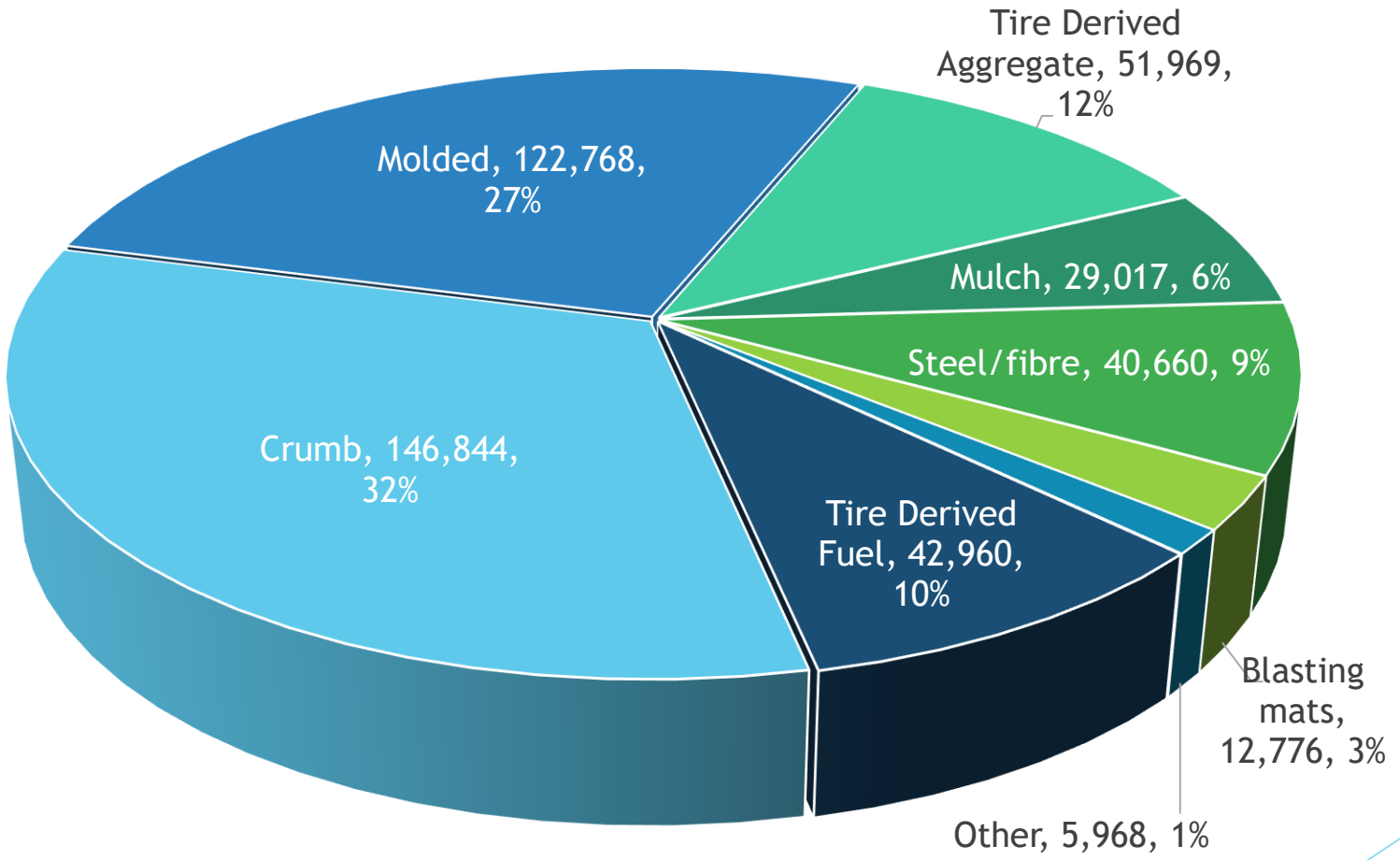
- Ferrous metals: sheet steel, steel, cast iron (70%)
- Non-ferrous metals: aluminum, copper/brass, and others (6%)
- Auto Shredder Residue (ASR): glass, plastics, foam, etc. (24%)
  - 320,000 - 448,000 t/y of ASR

Data challenge!



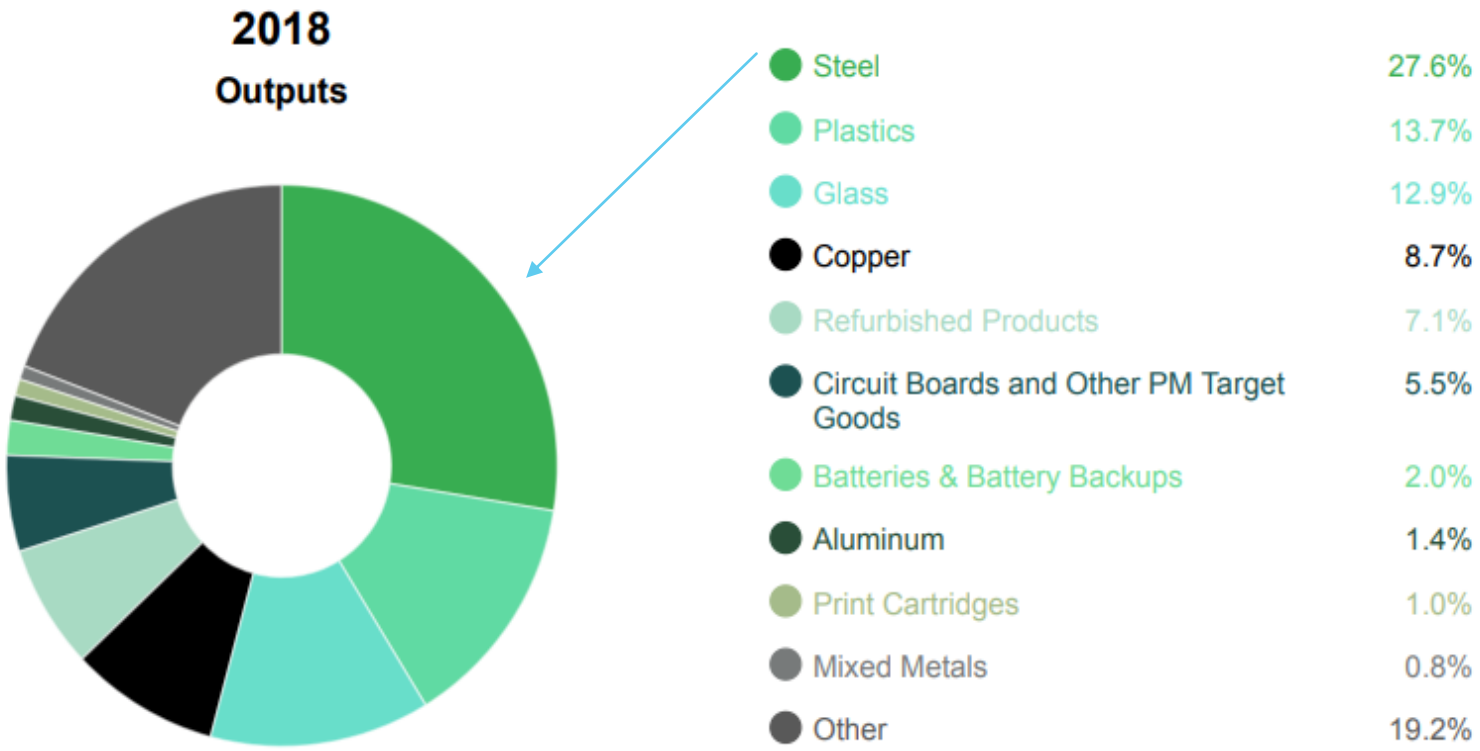
Source: Argonne Lab.

End-of-life tires
(2017 data, **452,962 t.** reused, recycled, or recovered)



Electronic waste

(2018, EPR and Stewardship Programs = **106,882 t.**)

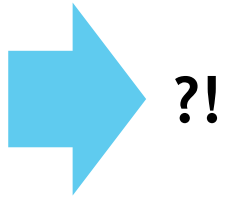


Source: Greentec, 2018

Large appliances ("white goods") (2016, 330,820 tonnes)

Province/Territory	Tonnes Diverted
British Columbia	20,493
Alberta	9,365
Saskatchewan	1,995
Manitoba	N/A*
Ontario	11,739
Quebec	276,767
New Brunswick	N/A*
Nova Scotia	1,412
Prince Edward Island	6,325
Newfoundland & Labrador	N/A*
Yukon, Northwest Territories, and Nunavut	N/A*
Total (includes suppressed data)	**330,820**

✓



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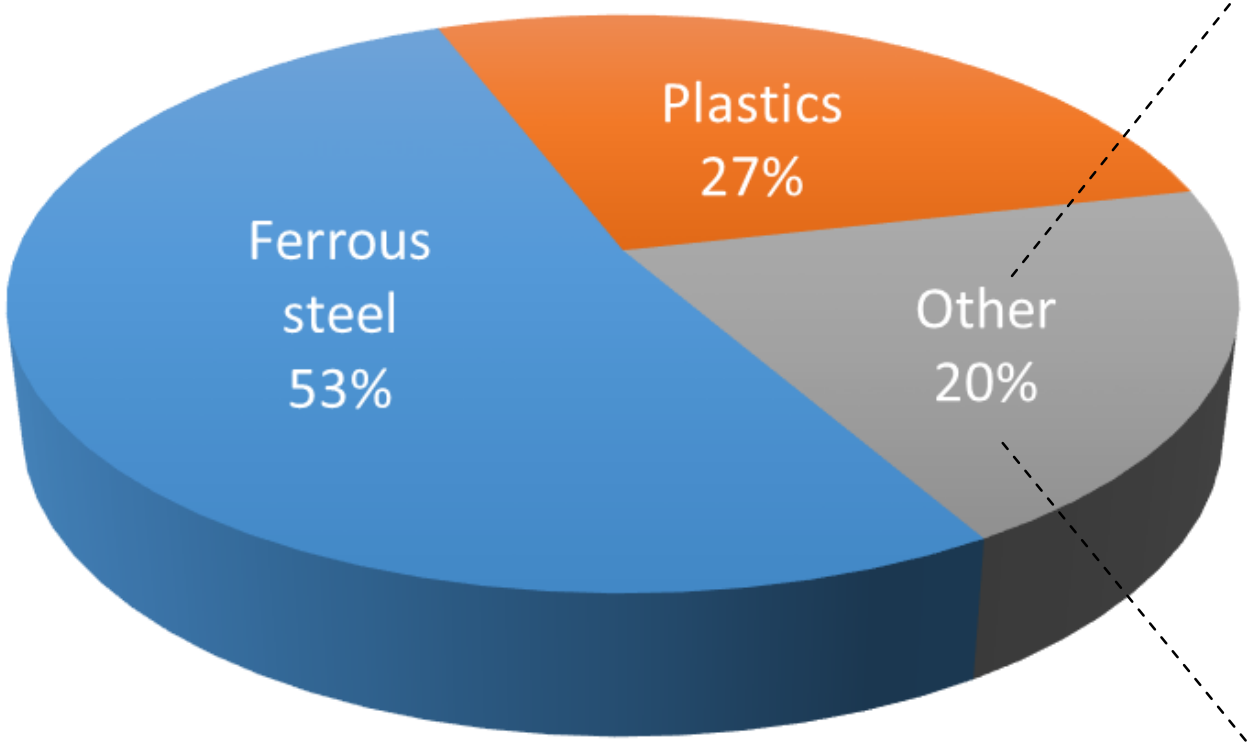
*Data suppressed to meet the confidentiality requirements of the Statistics Act

Small appliances
(2018, BC only, **5,092 tonnes**)



OTHER	20%
Aluminum	1.5%
Wire, cables & string lights	4.2%
Copper	2.3%
Glass	2.0%
Circuit boards	2.3%
Rechargeable batteries	1.2%
Paper based materials	0.5%
Non-rechargeable batteries	0.1%
Heating oil	0.5%
Waste to landfill	5.6%

Post-processing composition data

Batteries

- Lead acid batteries (LABS) – 129,500 tonnes lead
  - 129,500 tonnes secondary lead (an NRCan #)
  - 34,000 tonnes of LABs under EPR programs (BC, MB, NS, PE)
- Consumer batteries – 5,000 tonnes through Call2Recycle and Ontario MSHW
  - Rechargeable: NiCd, NiMH, Li-ion, SSLA/Pb
  - Single-use: Li primary, alkaline, C-Zn
- Battery Council International:
  - 2014-2018 National (USA) Recycling Rate Study LABS = 99%
- USA rate similar to Canada. Why?
  - Because of the high value of lead and similar (even integrated) end-of-life vehicle management systems.

Gaps

- **Agricultural/food waste:** Data missing – food and animal wastes from rendering plants used to make protein meals and fat products; food wastes or other wastes sent to farms for use as animal feed or bedding; and, agricultural waste (including livestock manure and offal) processed via land application or on-site anaerobic digestion.
- **Battery recycling:** Large amounts of batteries are used by the industrial, commercial and institutional sectors. Neither recycling practices nor quantities are known.
- **Deposit-return system and EPR programs:** Clarify with STATCAN to determine if WMIS includes deposit return systems for beverage containers and materials from EPR programs. These materials would be mostly aluminum, glass and some plastic.
- **Foundry sand utilization:** Follow up with the Canadian Foundry Association to confirm current practice and seek quantities.
- **Metal shredder capacity:** Need to identify the capacity and throughput of metal shredders in Canada (in tonnes/year) in ore detail.
- **Scrap aluminum, copper, zinc and nickel:** No data on domestic recycling operations.
- **Scrap paper:** Business-to-business waste paper flow data missing.
- **Wood ash:** The amounts produced are likely greater than 2 million t/y. Management pathways for the wood ash need to be identified through additional research

Next steps

- Identify missing materials and products that are recovered and/or recycled in Canada
- Consider how existing data gaps can be bridged
- Determine whether waste generated (the denominator) could be measured or deduced
- Find out how other countries measure CE
- Consider the pros/cons of a national “Circular Economy Survey” to capture more refined data on a regular basis

Questions?

- Funded by NRCan
  - Lands & Minerals Sector (LMS)
    - Rob Sinclair
  - Canadian Forest Service (CFS)
    - Anthony Imbrogno