



The contemporary Nickel Cycle

(selection only)

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Note

The slides shown hereafter only include a selection of the slides shown at the INSG (EEC) meeting on April 24, 2006.

The methodological details and results will be available to the public through scientific publications which are currently in preparation.

Vision of the Stocks & Flows (STAF) project

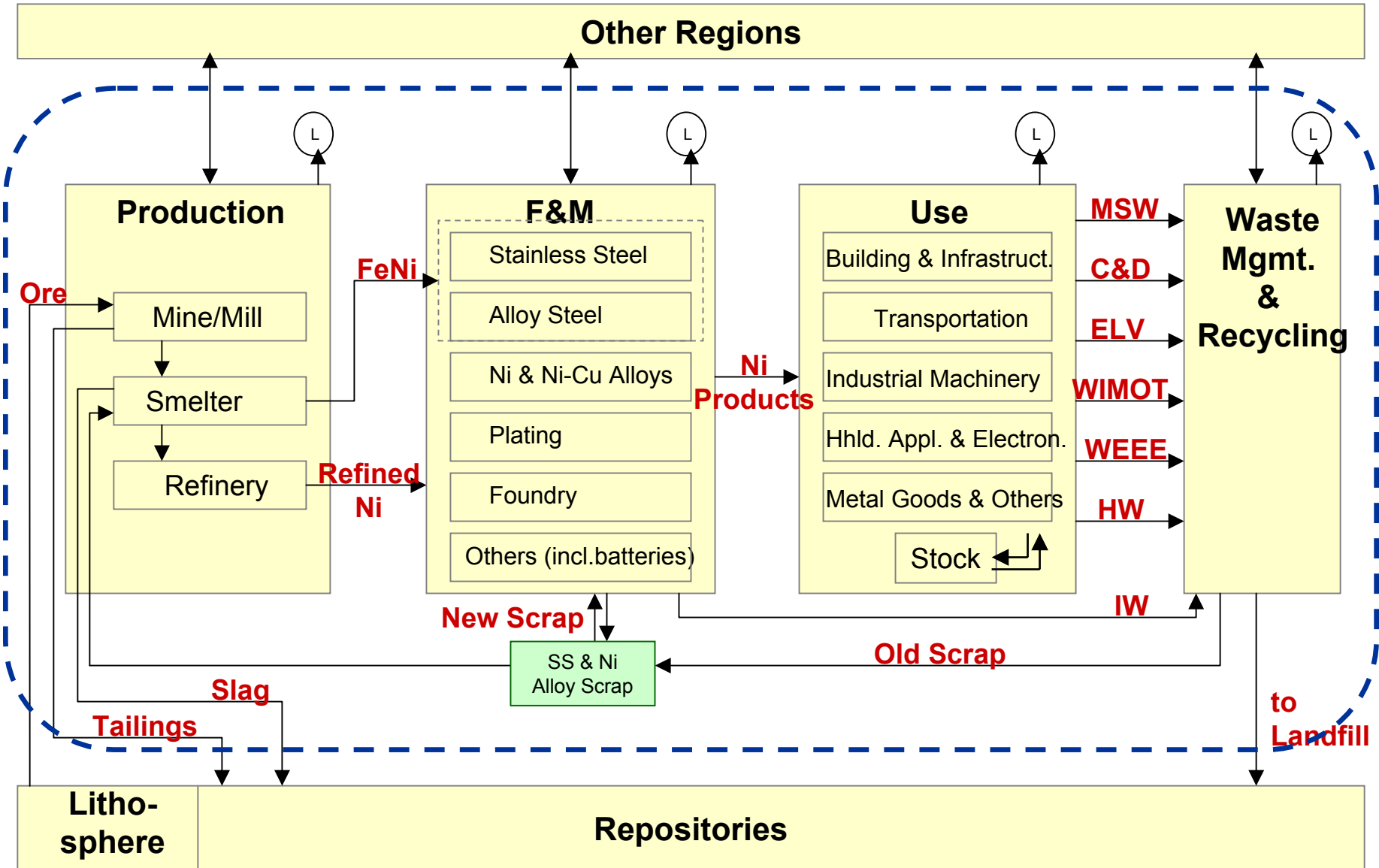
To explore the **sustainability** of the use of materials over space and time,
and to understand the **implications** for the next few decades of our results.

Investigated metals by the STAF project

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	110	111	112	(113)	114	(115)	116	(117)	118
(119)	(120)	(121)															

Stainless Steel

The anthropogenic nickel cycle



Compatibility with stainless steel cycle

The cycles for nickel, chromium, and iron use the same system definition and share key data on stainless steel.

1. Stainless steel production data

raw data for stainless steel production (total production, use of secondary materials)

2. Trade data for intermediate & finished products

3. End Use categories: Building & Infrastructure,
Transportation,
Industrial Machinery,
Household Appliances & Electronics,
Metal Goods & Others.

4. Waste flows

Trade of intermediate & finished products

1. Data collection

Intermediate products:

- 30 commodities (UN Comtrade: HS 1996, INCO 2001)
- data mostly reported as mass flows, some as monetary flows

Finished products:

- 65 commodities (UN Comtrade: HS 1996)
- data reported as mass, monetary, or unit flows

2. Data conversion to mass flows

3. Assign average nickel concentration to 95 commodities

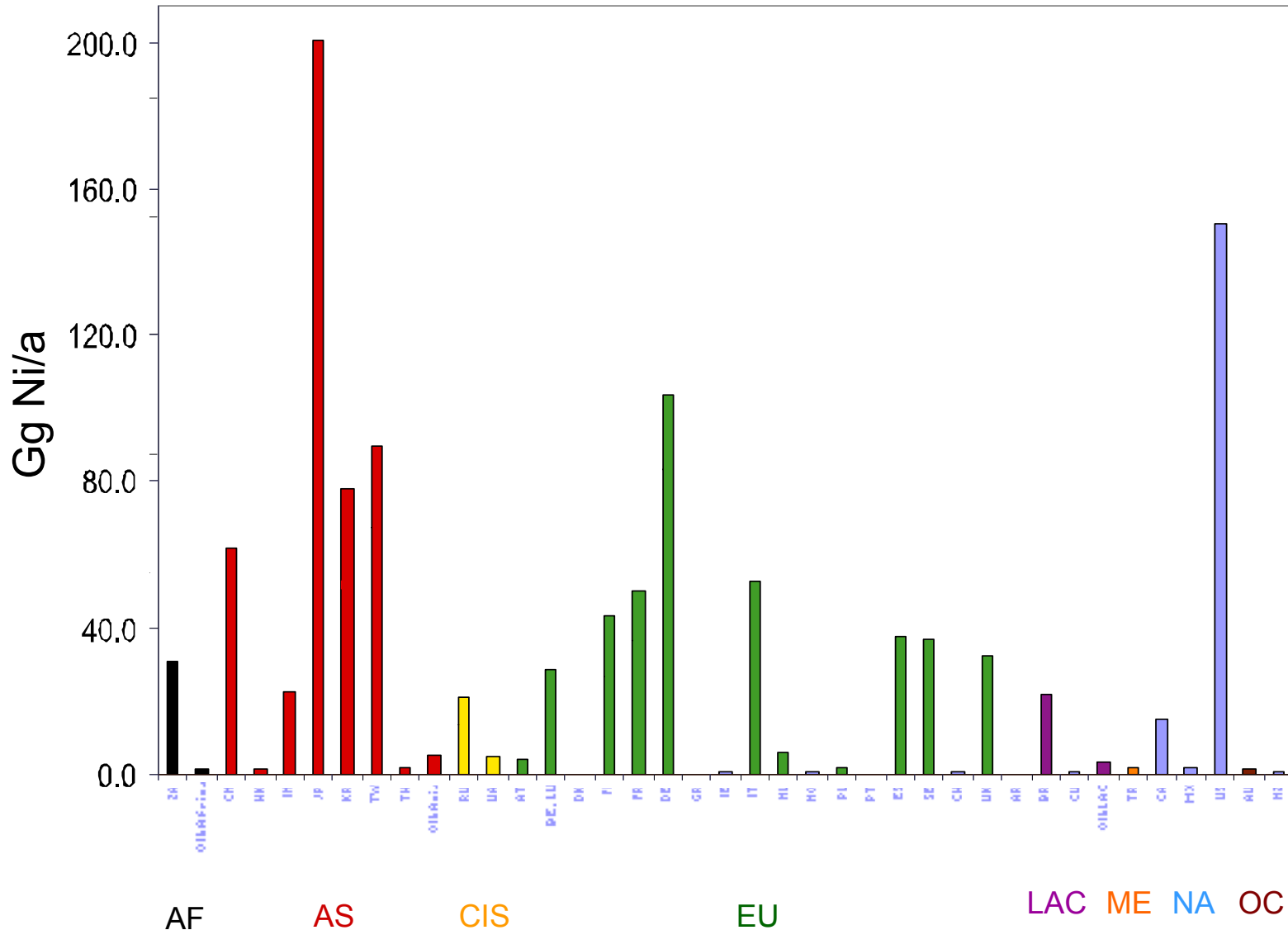
4. Calculation of nickel in intermediate and finished products



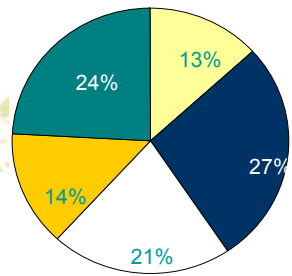
Seven Waste Flows

- Municipal Solid Waste (MSW)
- Construction & Demolition Debris (C&D)
- End-of-Life Vehicles (ELV)
- Wastes from Industrial Machinery & Other Transportation than ELV (WIMOT)
- Wastes from Electronics and Electrical Equipment (WEEE)
- Hazardous Wastes (HW)
- Industrial Wastes (IW)

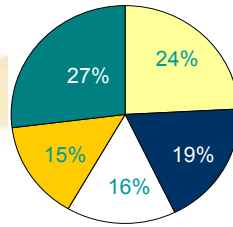
Worldwide first use of primary nickel in 2000



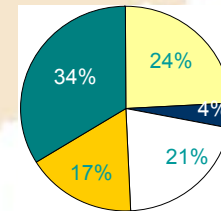
Regional differences in the end-use* of nickel



North America



Europe

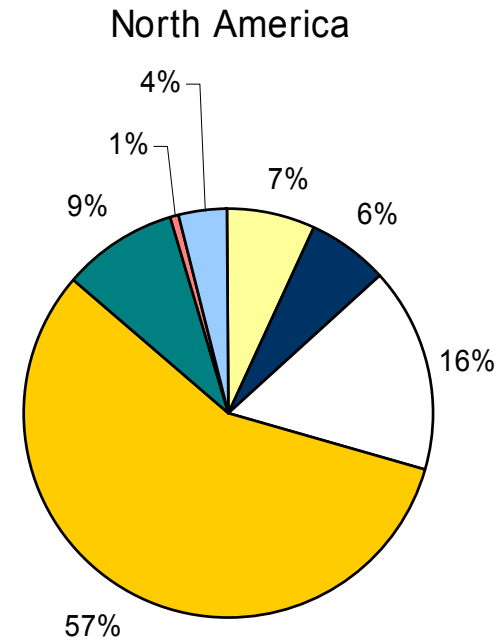
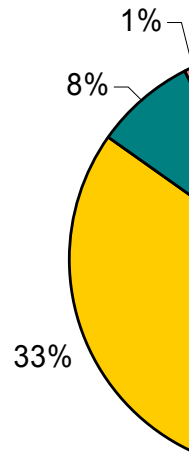
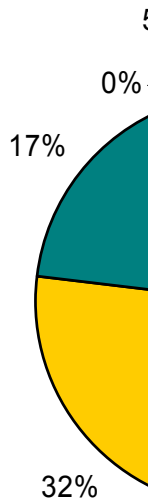


Asia

■ B&I ■ Trans □ IM ■ App&EI ■ MG&Oth

* End-Use as defined by the STAF project: end-use by the consumer (vs. by the manufacturer)

Regional differences in the nickel waste flows



■ C&D
 ■ ELV
 ■ WIMOT
 ■ WEEE
 ■ MSW
 ■ HW
 ■ IW

C&D Construction & Demolition Debris
 ELV End-of-Life Vehicles
 WIMOT Wastes from Industrial Machinery & Other Transportation (than ELV)
 WEEE Wastes from Electronics & Electrical Equipment
 MSW Municipal Solid Waste
 HW Hazardous Wastes
 IW Industrial Wastes

Summary (1/2)

Available nickel data so far

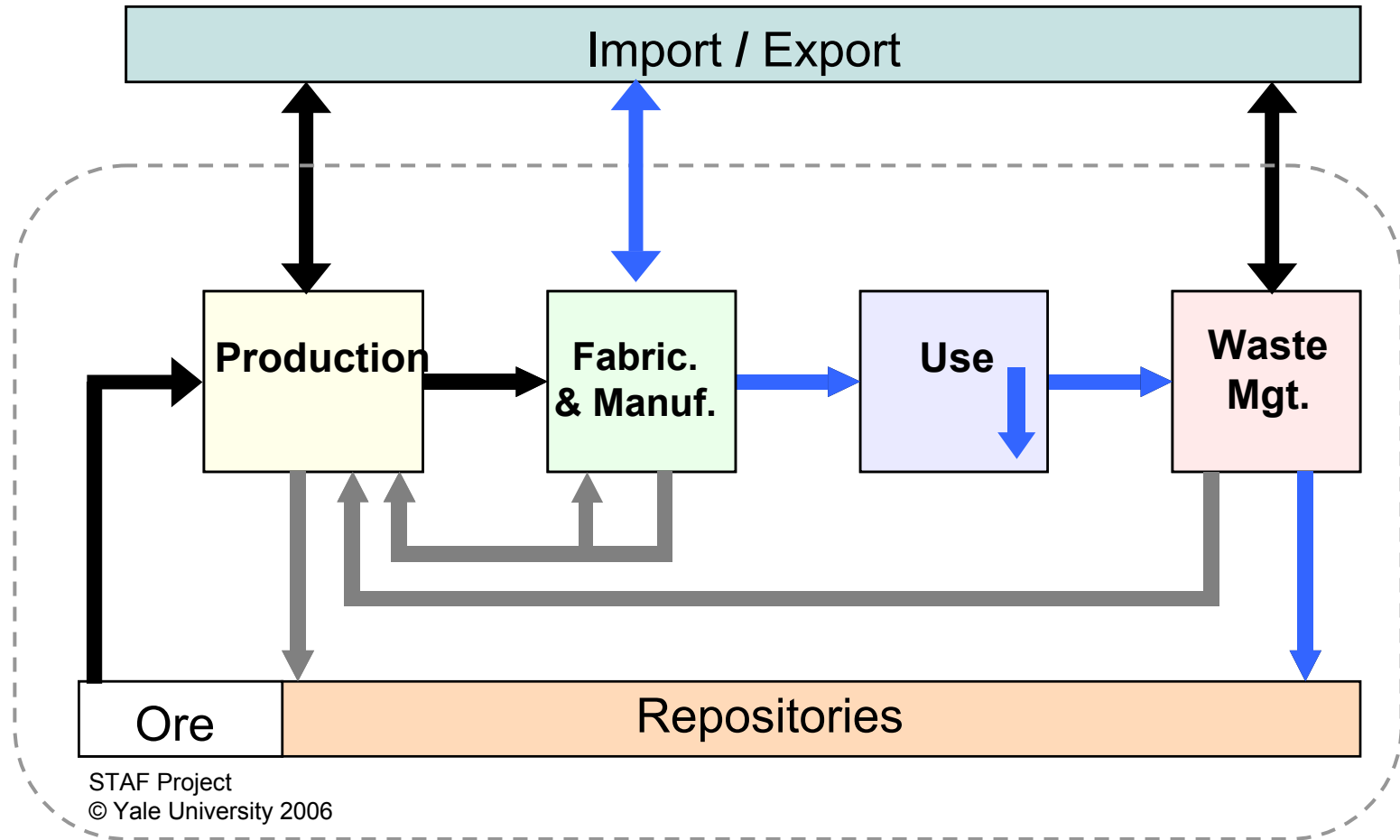
- nickel production
- first use of nickel (from primary & secondary nickel)
- nickel used in the manufacture of finished products.




New information provided by the Yale study

- system approach through all life stages of the anthropogenic nickel cycle
- trade data of intermediate & finished products (indirect trade)
- nickel entering end use (with the consumer)
- nickel leaving end use (waste flows)
- comprehensive scrap model
- nickel landfilled (estimate)

All data will be available on the country-level, and eventually be aggregated to the regional and global level.

Data availability (nickel content)



-  data available through statistics (INSG, etc)
-  data known to particular industry, but usually not available in statistics
-  no data available, estimated by Yale study

Summary (2/2)

Significance of additional Yale data

- nickel entering use as a *driver for nickel demand*
- nickel entering use as a *driver for future scrap availability*
- nickel leaving use as a *driver for today's recycling availability*

As this data will be available on a country-level, it will allow a country-specific interpretation of the data (vs. western world or world)

Benefits from the Stocks & Flows project

- cross-metal analysis (e.g., together with the cycles for iron and chromium, the nickel cycle allows to complete a stainless steel cycle)
- independent academic assessment

What are the questions we wish to answer in the future?

- incorporate the STAF nickel, chromium and iron data into a comprehensive stainless steel cycle
- in-use stocks of metals
- spatial aspects of metal use
- future stocks and flows (scenarios)
- leakage rates of metals

Note: The degree to which these questions will be addressed in the future will depend on funding & capacities of the STAF project.