OECD PROGRAMME ON MATERIAL FLOWS AND RESOURCE PRODUCTIVITY

GUIDANCE MANUAL

Volume II

A Theoretical Framework for Material Flow Accounts and their applications at the national level

London Group on Environmental Economic Accounting

26-30 March 2007

Johannesburg, South Africa

Context

OECD work on Material Flows and Resource Productivity

Mandate and purpose

- Implementing the OECD Council Recommendation **(April 2004)**
- Responding to requests by G8 Heads of State and Government **(Evian, June 2003; Sea Island, June 2004; 3R initiative, Japan)**
- Supporting OECD policy analysis and evaluation

Foundations

- OECD Seminar in 2000
- Member countries initiatives
- International work: Eurostat guide; SEEA; research work

Context

OECD work on Material Flows and Resource Productivity

Co-operation and co-ordination

- **Within OECD**
  - **Environment Directorate**
  - **Horizontal programme on Sustainable Development**
  - **Statistics Directorate** (accounting frameworks for SD statistics)
  - **Science, Technology & Industry Directorate** (I-O analysis & globalisation, sustainable manufacturing)
- **European Union: Eurostat and TF-MFA, EEA, DG ENV**
- **United Nations: UNSD and UNCEEA; UNEP**
- **Other: London Group; IWG Environment Statistics; Wuppertal Institut, IFF Vienna, CUEC, WRI**

Context

OECD work on Material Flows and Resource Productivity

Main outputs

1- Brochure on MFA

2- Guidance on methodological and measurement issues

3- Guidance on the interpretation and use of MF and RP indicators

4- Measured indicators – pilot data set

5- Overall report on MF in OECD countries and beyond

Guidance manual "Measuring material flows and resource productivity"

- **User-friendly parts** → Non-experts
- **Technical parts** → Experts

Guidance manual
"Measuring material flows and resource productivity"
Structure

- **Volume I: Material flows and resource productivity**
  - overall framework for material flow analysis (MFA),
  - description of different kinds of measurement tools, including accounts and indicators, articulated according to their purposes and uses,
  - discussion of those issues and policy areas to which MFA and material flow indicators can best contribute, and
  - guidance on how to interpret material flow indicators.

- **Volume II: A Theoretical Framework for Material Flow Accounts and their applications at the national level**

- **Volume III: Developing MF accounts – implementation guide**
  - Modular structure: menu of options based on decision tree including simplified, didactic part
  - To promote harmonised implementation
  - To be applied by countries according to own needs & context

Volume II: A Theoretical Framework for Material Flow Accounts and their applications at the national level

Evolution

- **Initial programme centred on EW-MF**
  - ➢ First draft based on EW-MFAcc + breakdown of DMI & utilisation of NAMEAs and PIOTs for Indirect flows calculation
  - ➢ link to SEEA chapter 3
- **Workshops and other OECD events – in particular Berlin, May 2005 and Rome, May 2006**
  - ➢ Experts' and countries' requests of
    - Broadening the scope from EW-MFAcc to other MFAcc
    - Ensuring maximum coherence with the SEEA and SNA
- **UNCEEA meetings, in particular New York, June 2006**
  - ➢ Presentation of a paper on the OECD MF&RP work programme and the SEEA – open issues
  - ➢ Formal request by the UNCEEA & UNSD of enhancing coherence with the SNA and broader scope, as to contribute to SEEA's revision
- **Formulation of proposals aimed at complying with these requests**
  - ➢ Electronic Discussion Group consultation
- **Eurostat Task Force on Material Flow Accounting**
  Meeting of 4 December 2006

⇒ **Revised broader draft, based on all these inputs**

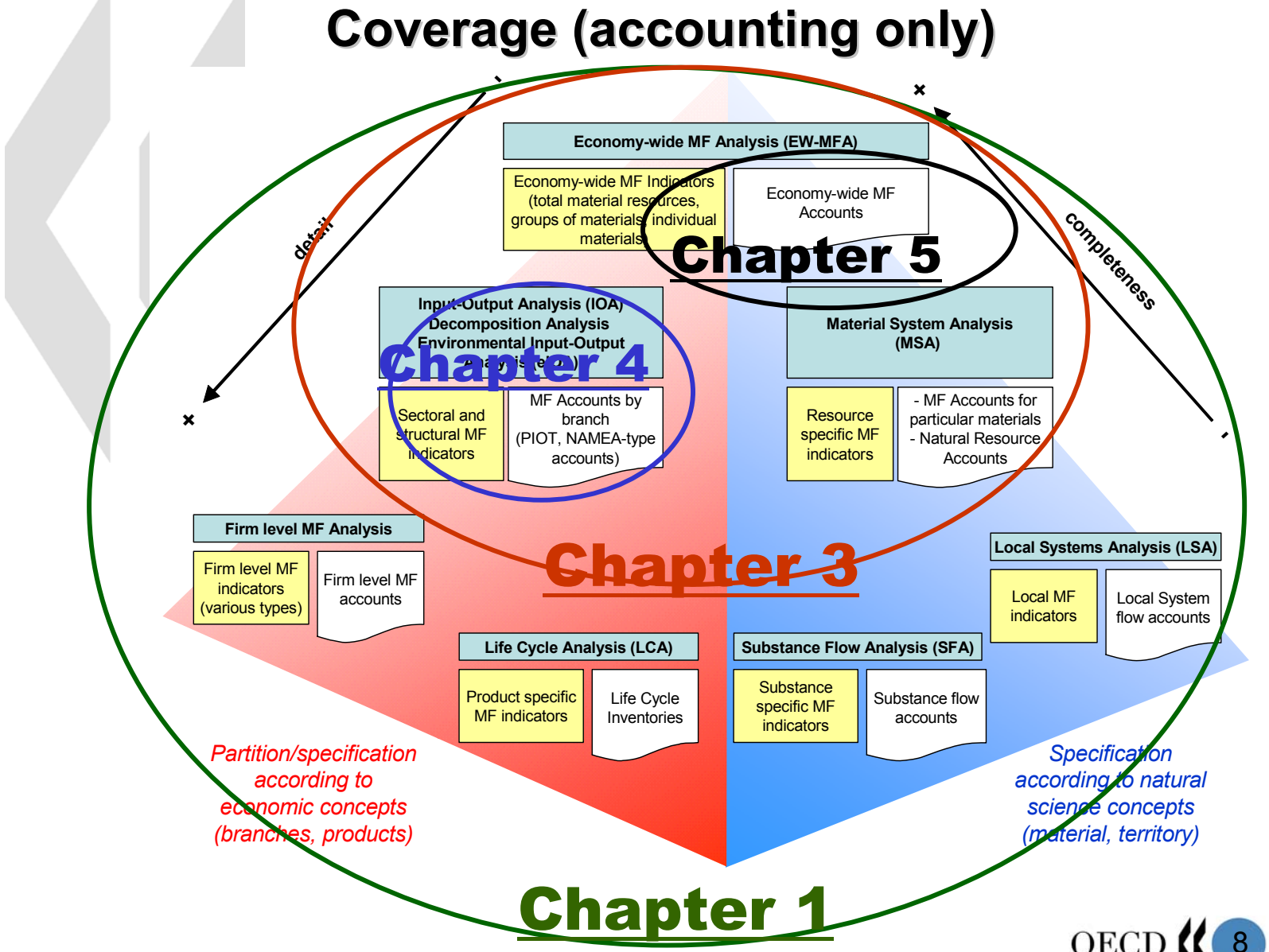
Volume II: A Theoretical Framework…

Structure

Introduction

- General conceptual & methodological framework
- Characteristics of National Material Flow Accounts (NMFAcc)
- A complete and exhaustive framework for NMFAcc
- Breakdown by activity of the inputs and outputs of the National socio-economic system and the calculation of its indirect flows
- Economy-wide Material flow accounting (EW-MFAcc) framework for national systems

Volume II: A Theoretical Framework…



Volume II: A Theoretical Framework…

Contents

Introduction

Clarifies aims, structure and main characteristics of this Volume of the guidance manual. These are

- Theoretical and technical nature
- Didactical intent
- No aim to guide practitioners in the implementation of any particular MFAcc scheme (purpose of Volume III).
- The issue of coherence with the System of National Accounts is dealt with in relation to the individual tools (it cannot be dealt with respect to MFA as a whole)

Volume II: A Theoretical Framework…

Contents

1. General conceptual & methodological framework

- Generally valid framework
- Applicable to whatever System / Material / Aggregation level
- General abstract concepts, to be made operational according to the context (i.e. focus system):
  - **Material**
  - **Activity**
    - **Transformation & Accumulation**
  - **System boundary**
  - **Flow**
    - **Internal/External/Cross boundary**
    - **Input/Output**
    - **Used/Unused**
    - **Direct/Indirect**
- General Supply/Use scheme
- Discussion of the measure of total flows, getting higher as the systems are looked at in greater detail
- Generalised notions of gross/net flows

Volume II: A Theoretical Framework…

Contents

2. Characteristics of National Material Flow Accounts

- Comprehensiveness, integration between levels, coherence with national accounts

"The limits of the available information oblige in certain cases to depart from full coherence with the SNA. This is the case in particular of the Economy-wide Material Flow Accounts described in chapter 5 of the manual. Even in this case, however, the basic structure of the system guarantees a high degree of comparability of MFA data with monetary aggregates."

Volume II: A Theoretical Framework…

Contents

3. A complete and exhaustive framework for NMFAcc

- SEEA-based framework for the application of chapter 1's concepts to national systems
- Describes MFAcc that are fully coherent with the SNA
- The socio-economic system is broken down gradually, introducing concepts and conventions in relation to the breakdown level when they are first needed (didactical intent)
  - **Starts with black/box worldwide socio-economic system**
  - **Develops it intersecting the two basic dimensions**
    a. **Physical (transformation / accumulation)**
    b. **Economic (production / consumption / capital formation)**
  - **Further develops it introducing breakdown of production activities**
  - **Finally introduces the rest of the world**
- Develops example PSU and PIO tables progressively (didactical intent)

Volume II: A Theoretical Framework…

Contents

4. Breakdown by activity of the inputs and outputs of the National socio-economic system and the calculation of its indirect flows (based mainly on K. Schoer's input)

- Emphasises the importance of MF information on the (cross-boundary) flows of the socio/economic system broken down by kind of economic activity
- Illustrates hybrid or NAMEA-type MFAcc, which can be considered a partial realisation of chapter 3's accounting scheme, and
- Discusses indirect flows and the approaches to their calculation, focussing in particular on IO approaches, taking also into account the compilation costs of the different kinds of tables

Volume II: A Theoretical Framework…

Contents

5. Economy-wide MFAcc framework for national systems

(based mainly on Eurostat's methodological guide)

- Eurostat-guide-based scheme
- Pragmatic specification of chapter 3's scheme for quasi-black-box type National MFAcc (only physical distinction inside the socio/economic system)
- Uses databases highly **detailed** by material for the construction of highly aggregated accounts/indicators
- **DEVIATES PARTIALLY FROM SNA**:

  Renounces to coherence with SNA and to details to gain in feasibility, communication power, holistic meaningfulness
- Relations between SNA-coherent and EW MFAcc are discussed and graphically and numerically shown (reconciliation tables, to be developed)

Volume II: A Theoretical Framework…

Contents' highlights – chapter 1

Two different types of material balances are distinguished, concerning respectively:

a. the exchange of individual materials (or material's groups) (e.g. a market)
b. the transformation of materials that are refined, combined, mixed, burnt…

The Material Balance principle equally applies to both. However:

a. the materials appearing on one side of the balance (supplied quantities) are *physically identical* to those appearing on the other side (used quantities)
   ⇒ **PSUTs read by row couples**

b. the materials appearing on one side of the balance (inputs) are *physically different* from the materials that appear on the other side (outputs)
   ⇒ **PSUTs read by column couples, PIOTs**

Volume II: A Theoretical Framework…

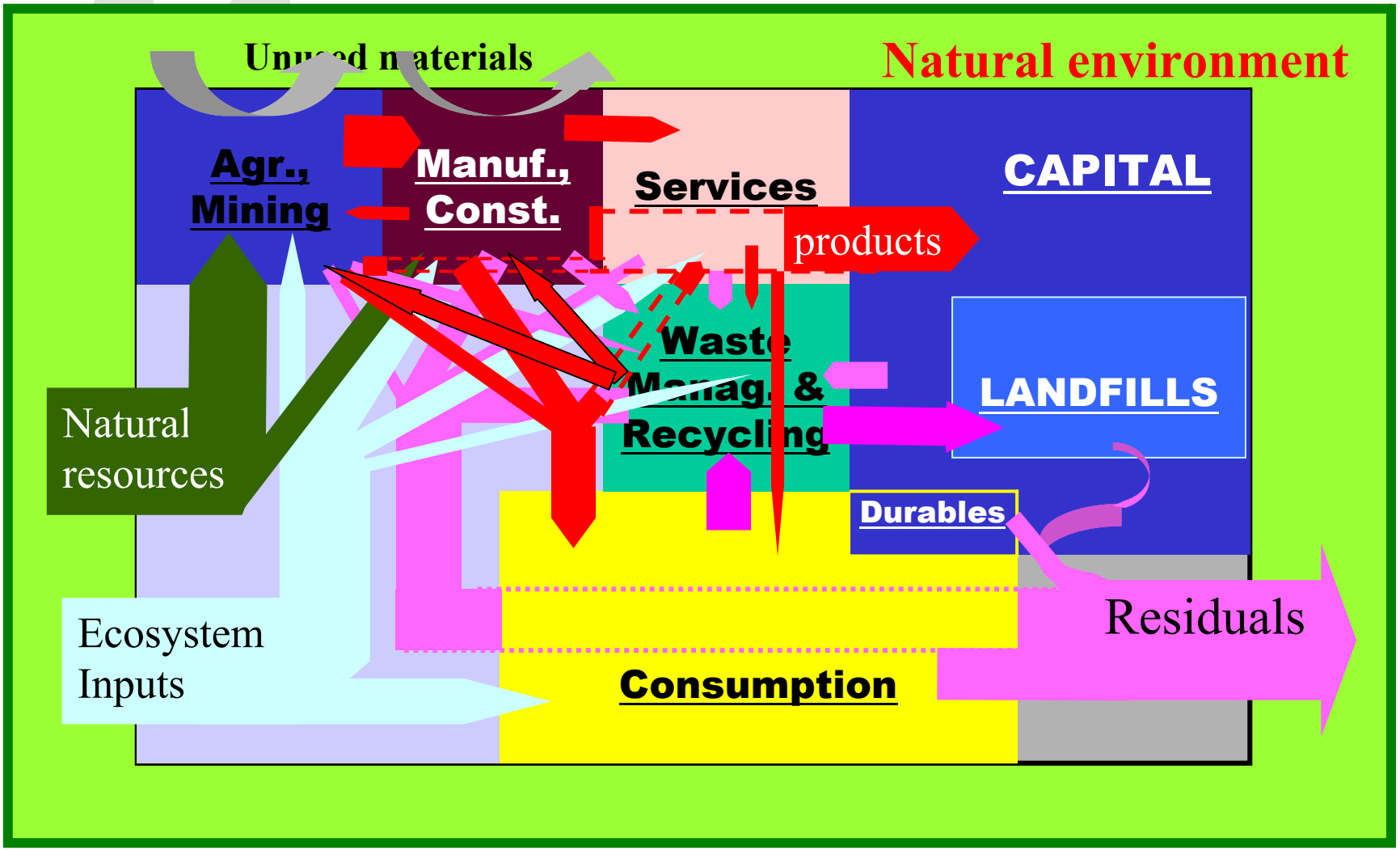
Contents' highlights – chapter 3 – approach

Didactic intent:

1. Simplification: national socioeconomic system having material exchanges with nature only
   - **gradual subdivision (next slide)**
   - **example tables at all stages of subdivision**
2. Full-fledged scheme, including rest of the world
   - **Activities of residents abroad and of non-residents internally are not dealt with, though could be easily introduced**
   - **Also flows of waste are considered**

Volume II: A Theoretical Framework…

Contents' highlights – chapter 3 - progression



Volume II: A Theoretical Framework…

Contents' highlights – chapter 3 – Example tables

- Imaginary country, always the same, getting gradually more detailed
- Material and activity "classifications" adapted to the OECD programme's needs
- Emphasis on the description of matter circulation: wide use of example PIOTs besides PSUTs
- Two types of example PIOTs:
  - Describing all flows of each individual type of materials
    - ➢ Link to NAMEA
  - Describing the whole transformation chain of specific natural resources or kinds of materials
    - ➢ Link to the description of life cycle of specific materials and substances, or even products.

Volume II: A Theoretical Framework…

Contents' highlights – chapter 4 (1/2)

The departure of EW-MFAcc from perfect coherence with the SNA is explained in comparison with section 4's NMAFcc framework

Besides the aggregation level by activity, the differences are in the system boundary:

a. Between socio-economic system and natural system:
   treatment of biomass cultivation/harvest (see next slide)
b. Between the aational system and the rest of the world:
   compliance with residence principle not strictly necessary

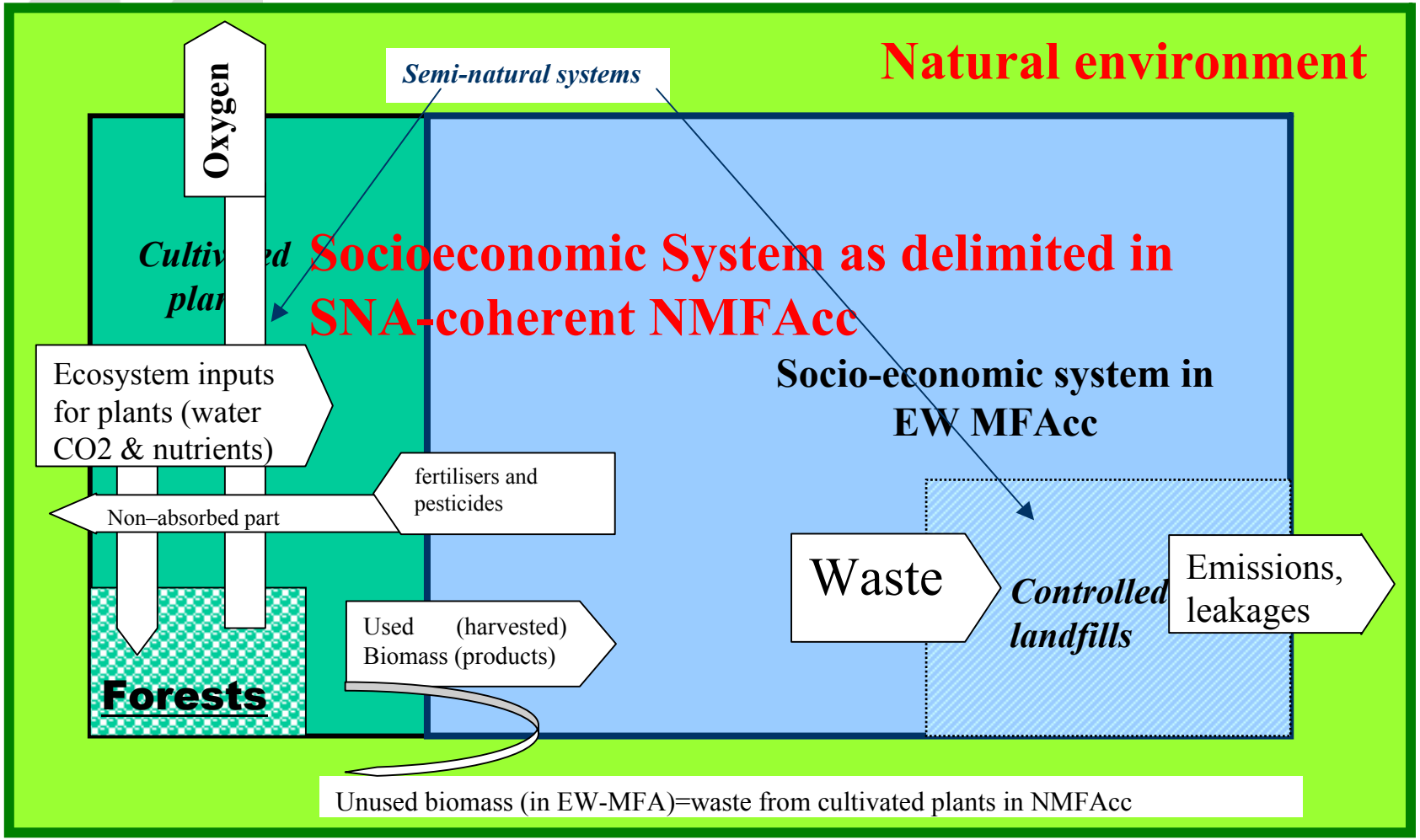
Our aim is to make differences clear, to highlight their *raison d'etre*, discuss their impact on aggregate measures and show how they can be reconciliated

⇒ No need to "impose" 100% coherence

Volume II: A Theoretical Framework…

Contents' highlights – chapter 4 (2/2)

Main difference between SNA-coherent NMFAcc and EW-MFAcc



"Onore al piccone e ai suoi più moderni equivalenti: essi sono tuttora i più importanti intermediari nel millenario dialogo fra gli elementi e l'uomo"

Primo Levi
Il sistema periodico, Carbonio