The Role of Sustainable Industrial Areas in the International Context & their Potential to Contribute to CC Mitigation & Adaptation
Climate change adaptation and mitigation: The role of sustainable industrial areas

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«Take home message»

• Industrial zones / parks: main global pattern of industrial development;

• Global warming: key challenge for economic activities and industrial areas;

• Crucial need for adaptation and mitigation strategies for industrial areas (brownfield and greenfield);

• Industrial areas can be part of the solution: SIAs / IEPs, including carbon utilization.
For the last ~ 70 years, main spatial pattern for industrial development:

«Industrial zones»
«Industrial estates»
«Industrial parks»
«Industrial areas»
Industrial Parks: description

⇒ A defined geographical area which contains businesses of an industrial nature.

⇒ The essential element: the estate is administered or managed by a single authority that has defined jurisdiction with respect to tenant companies.

⇒ The authority makes provision for continuing management, enforcing restrictions on tenants and detailed planning with respect to lot sizes, access and utilities.

(Source: UNEP Industry and Environment Review, 1996)
Possible impact of global warming:
Economic activities likely to be negatively affected by higher temperatures.

Estimates:
- Global GDP by 2050: 23%
- Morocco GDP by 2050: 20%

Source: David Rotman, *MIT Technology Review*, Vol. 120, N° 1, Jan/Feb 2017, pp. 60-63
Industrial areas: vulnerable to climate change

Huge needs for adaptation and prevention

Priority: infrastructures to ensure continuity of economic activities

- Secure access to water and energy;
- Secure logistics;
- Preventing impacts of floods, storms, etc.
The Saltina River, city of Brig (Valais): mud flood in 1993
Adapting to climate change: flood prevention

«Mobile» bridge over the Saltina river (Brig, Valais)
Adapting to climate change: flood prevention
«Mobile» bridge over the Saltina river (Brig, Valais)
Main strategy for climate change mitigation:

De-carbonize

Decouple energy function from fossil carbon

Relative vs absolute decarbonization?
Industrial areas:
large emitters of GHGs, particularly CO$_2$

1) Need to quantify these emissions

2) Industrial areas, part of the solution:
   - Cleaner Production and Resource Efficiency (RECP)
   - CO$_2$ capture and utilization (CCU)
Inter-enterprises synergies or Industrial Symbioses

Eco-industrial Parks (EIPs) or networks
Environmental management of industrial estates

UNEP – DTIE, 2001
Colin Francis & Suren Erkman
United Nations Publication
UNIDO Global Assessment of EIPs:

- EIPs as major actors for low carbon activities
- EIPs as key element of regional development
- EIPs as part of urban infrastructure
- Plan and invest accordingly
- Create business opportunities, attract investment

Strategy:
Establish overall framework for mainstreaming and upscaling eco-industrial parks.
CO₂ utilization

Mineral carbonates

Organic carbonates

C-O bond formation

C-C bond formation

C-N bond formation

Hydrogenation

Biological utilization

Direct utilization

Supercritical CO₂

CO₂ utilization

Methane

Methanol

Urea

Acrylic acids

Salicylic acid

Succinic acid

Sparkling beverages
Carbon capture and utilization (CCU)

- **Chemical pathway**
  - Inorganic carbonates
    - C-O bond formation
  - Organic carbonates
    - C-C bond formation
  - Polycarbonates
  - Urea
    - C-N bond formation
  - Carbamates
  - Oxazolidones
  - Polyurethane
  - Thermo-, electro-, photochemical or photocatalytic reduction
  - Carbon monoxide
  - Methanol
    - Formic acid
    - Methane
  - Chemical reduction
  - Hydrogenation
  - Sequestration

- **Physical pathway**
  - Biofuel/chemicals
  - Biomineralization
  - Sparkling beverage, extinguisher…
  - Solvent (supercritical CO₂)
  - Enhanced oil recovery

- **Biological pathway**
  - Bio-material (wood, biopolymers)
  - Other fuels
  - Carbon capture and utilization (CCU)

- **Carbon sources**
  - CO₂
  - Biofuel/chemicals
  - Bio-material (wood, biopolymers)
  - Solvent (supercritical CO₂)
  - Enhanced oil recovery
Conclusions / Perspectives

Promote / intensify two global initiatives:

- Upscale and upstream RECP, e.g. through SIA / EIPs;

- Systematic utilization of CO₂ for valuable products («carbon negative» industrial areas).
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Thank you!