Technology policies in a new setting : social and technological transitions and the climate change challenge

Insights from the material/steel industry

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Overview of the presentation

Introduction on climate stabilisation pathways and the "industrial transformation (IHDP-IT)" challenge

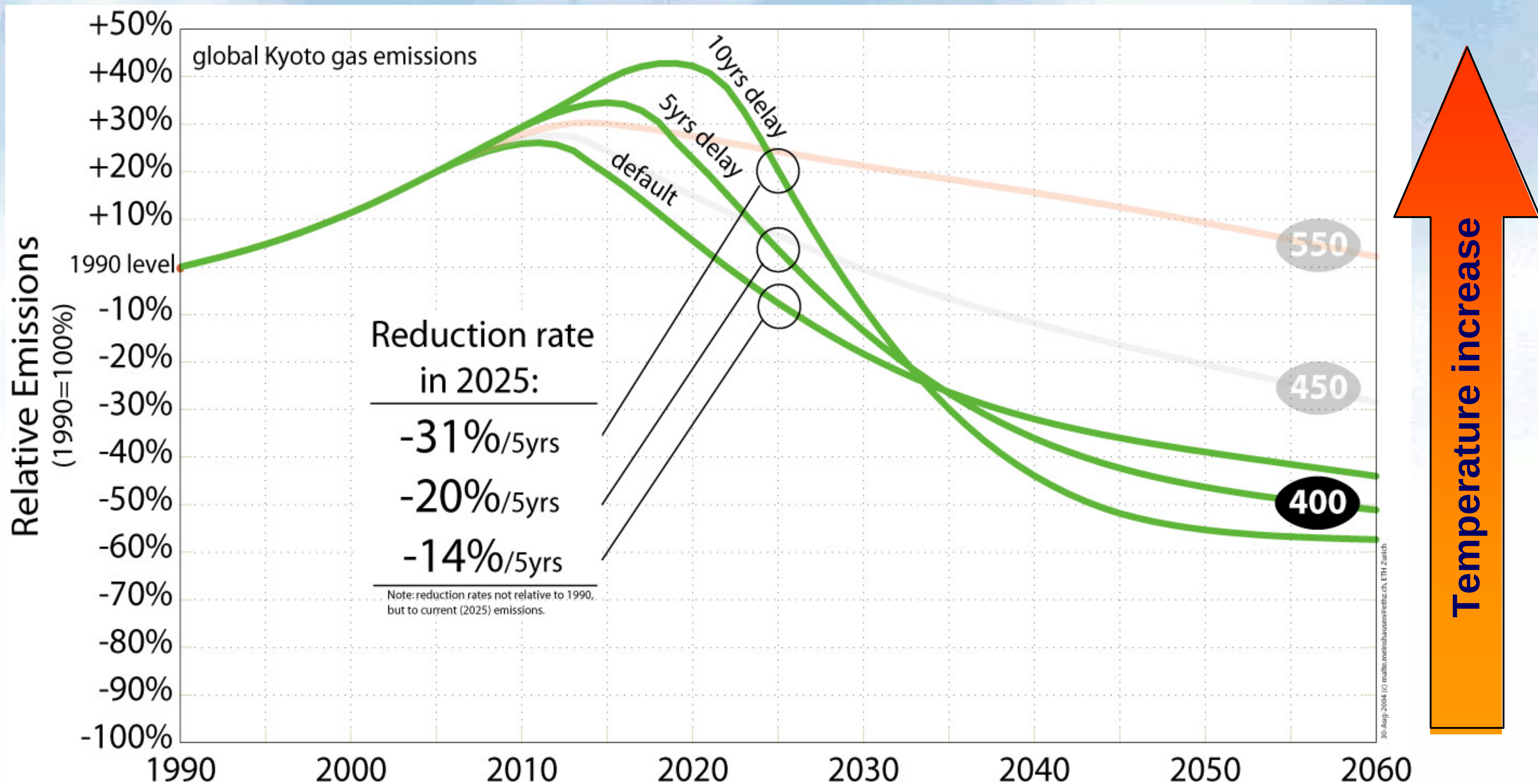
1 – Agenda of the Steel technological regime

2 – Technology development and selection : the ULCOS project

3 – Rationales for public intervention in demand-side policies

Conclusion and perspectives

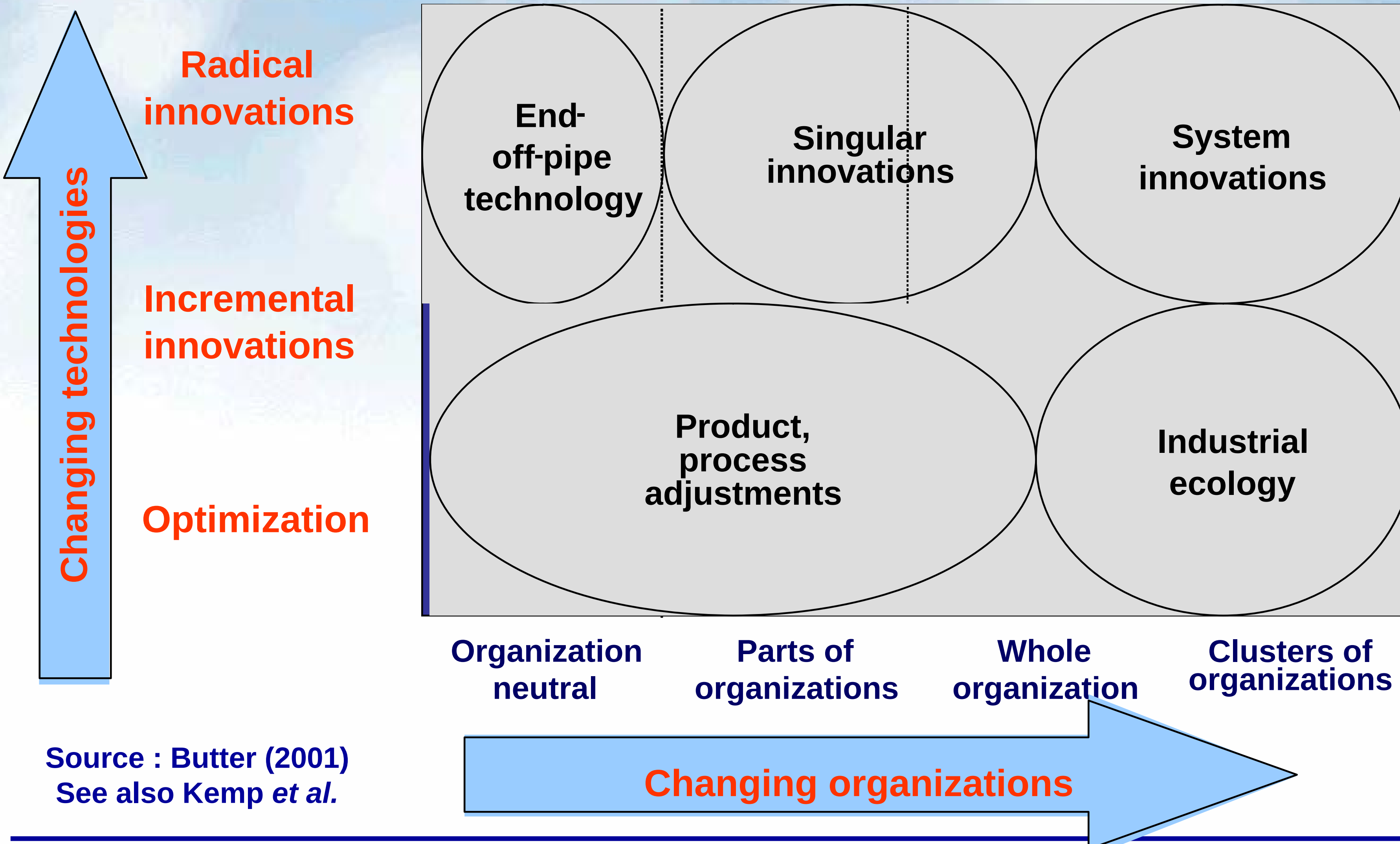
GhG stabilisation pathways and the challenges of a low carbon future (Factor4)



Note: (a) The S550Ce, S450Ce, and S400Ce stabilization scenarios are based on the EQW multi-gas emission pathways method, which builds on the gas-to-gas correlations within the pool of 54 SRES and Post-SRES scenarios (Meinshausen et al. submitted).
(b) Landuse CO_2 emissions are sharply decreasing in the default scenarios. If constant CO_2 emissions from the landuse sector were assumed, the emission reductions of the Kyoto-gases (fossil CO_2, Methane, N_2O, HFCs, PFCs, SF_6) have to be more pronounced. Alternatively, if emission allowances were given to avoided landuse emissions, overall emission allowances for the Kyoto-gases would have to be reduced accordingly (solid line).
(c) Delay profiles were calculated by assuming a 5 or 10 delay in global action. In the illustrative default scenarios, OECD and REF regions are assumed to enter stringent emission reductions by 2010, and ASIA and ALM by 2015.

Source : Meinhausen (2004)

Innovations for GHG mitigation



Source : Butter (2001)
See also Kemp *et al.*

[1] Agenda of the steel technological regime

- Challenges for the steel industry (Dollé, 2004 ; EU TechPlatform ; EU Steel Research Agenda 2030)
  - Globalisation of the steel industry
  - Climate challenge and competitiveness issues
  - ...
- Market failures in technology and environmental policies justify public intervention
- What are the conditions of the adoption of new technologies ?
  - Schumpeterian patterns of innovations are technology-specific (Malerba et Orsenigo 1996)
  - Technology is important in constraining the nature of market competition (Nelson and Winter 1982 ; Sutton 1998)

Evolution of the steel technological regime

- The steel technological regime is undergoing major transformation *vis a vis* :
  - Opportunity of technologies
  - Appropriability of technologies
  - Degrees of cumulativeness of technological knowledge
  - Characteristics of the knowledge base

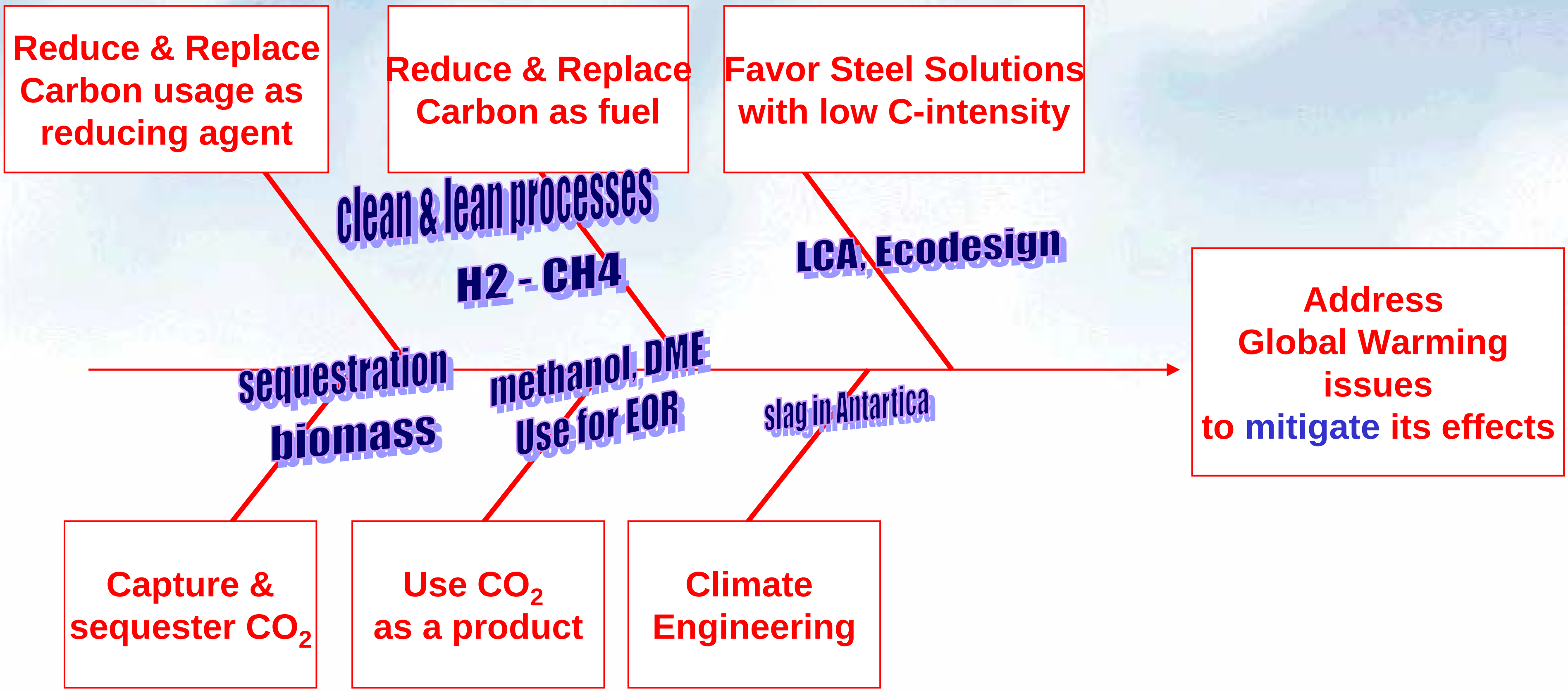
- But, prevalence of “large” established firm, relevant barriers to entrance of new innovators, technological lock-in
=> “Creative accumulation” (Breschi, Malerba & Orsenigo, 1999)

[2] ULCOS' objectives & targets within the EU Steel Techplatform

- ULCOS for Ultra Low CO_2 Steelmaking.
  - This IP is a strongly objective driven R&D project focusing on the delivery of new knowledge to produce Steel in the post-Kyoto context of the middle of the 21st century
- Objectives
  - address the post-Kyoto (first CP 2008-2012) situation, from the standpoint of the Steel Industry
  - identify low CO_2 future steel production routes
  - identify synergies with other European industries and society's expectations
- Target on emission reduction
  - high (50-70% of today's emissions of a benchmark Blast Furnace)

Technological solutions studied by the steel industry and its suppliers

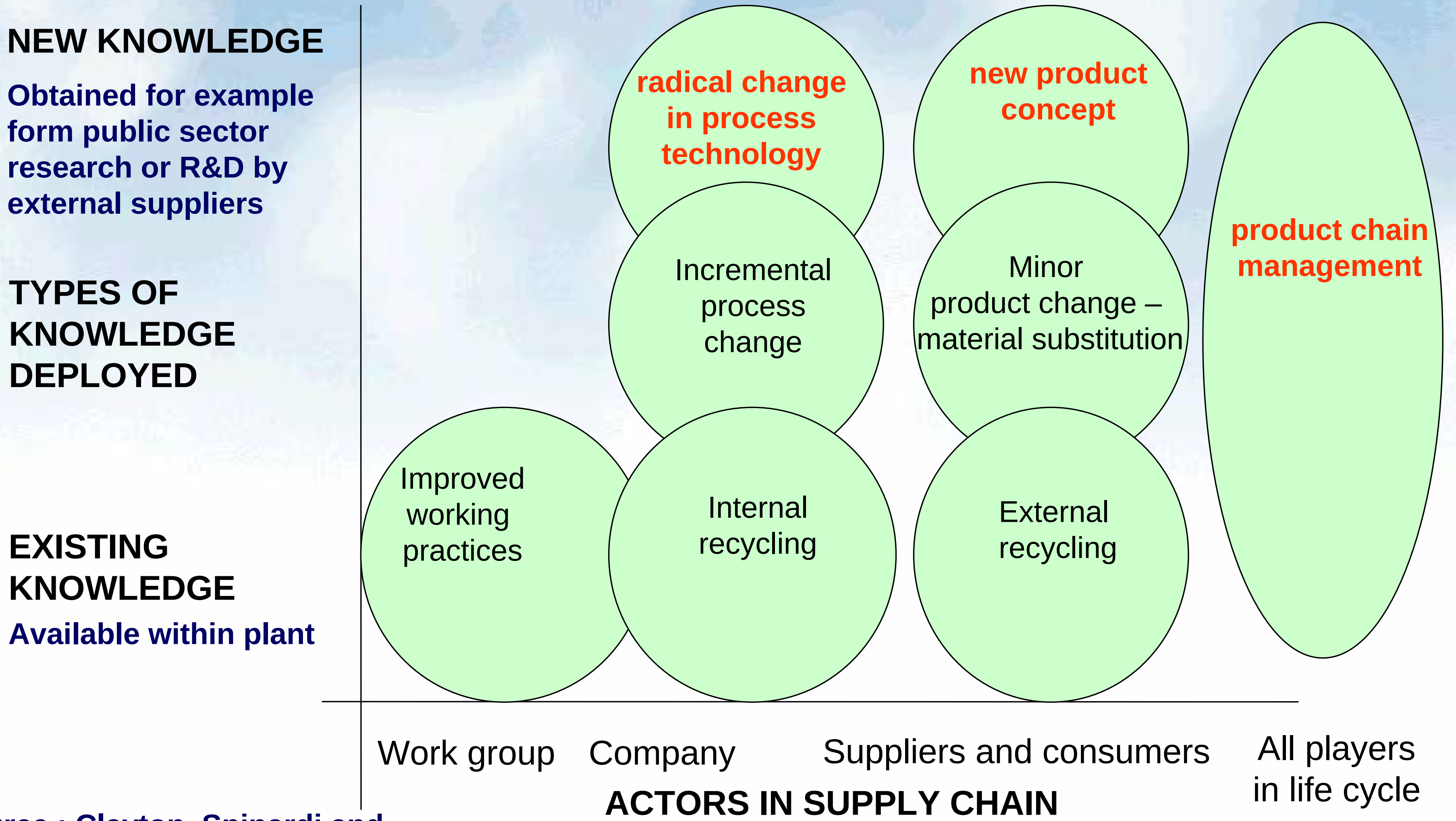
Emphasis on solving Steel Industry issues



IPCC & European viewpoint

Source : ULCOS program

[3] Rationales for public intervention to promote demand-side policies



Source : Clayton, Spinardi and Williams (1999)

6 main issues and research needed for transitions to Product-Service Systems (PSS)

Focus	Service transformation	
Design	from planned obsolescence	to sustainable product design
After sales support	from short term guarantee	to comprehensive after-sales support
Form of contract	from ownership	to eco-leasing
Mode of consumption	from individual consumption	to collective consumption
Need	from dependence	to reduced need
Sales revenue	from output maximisation	to least cost supply

WHAT IF WE COULD MAKE PIG IRON -- GROW ON TREES--

Source : NUCOR website

Believe it or not, we're working on it. We're in the process of developing a method of making pig iron, a major ingredient of steel, by using eucalyptus trees as fuel.

Why? Cleaner air, for one. Once the plant is up and running, we'll be able to zero out our carbon emissions from that facility.

But we're not doing it just so we can breathe easier. We're doing it for our clients, our employees and our earth.

It's Our Nature.®

Conclusion

- S&T policies complementary to the carbon-price signal are needed
- Attention needs to focus on :
  - Coordination issues as technology Co-evolve with the market structure (Nelson and Winter, 1982 ; Flaherty)
  - Conditions of adoption of technology and PSS strategies (Stahel, 1996 ; Montt, 1999 ; Tukker, 2002)
  - Transition management (Rip and Kemp ; Kemp and Rotmans ; Geels, 2005)
- Hypothesis :
  Irruption and diffusion of ULCOS technologies would facilitate a new “green” technico-economic paradigm

Thank you for your attention

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PhD Thesis

Global Change and Induced technical change : towards trajectories of radical innovations in the steel industry ?

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