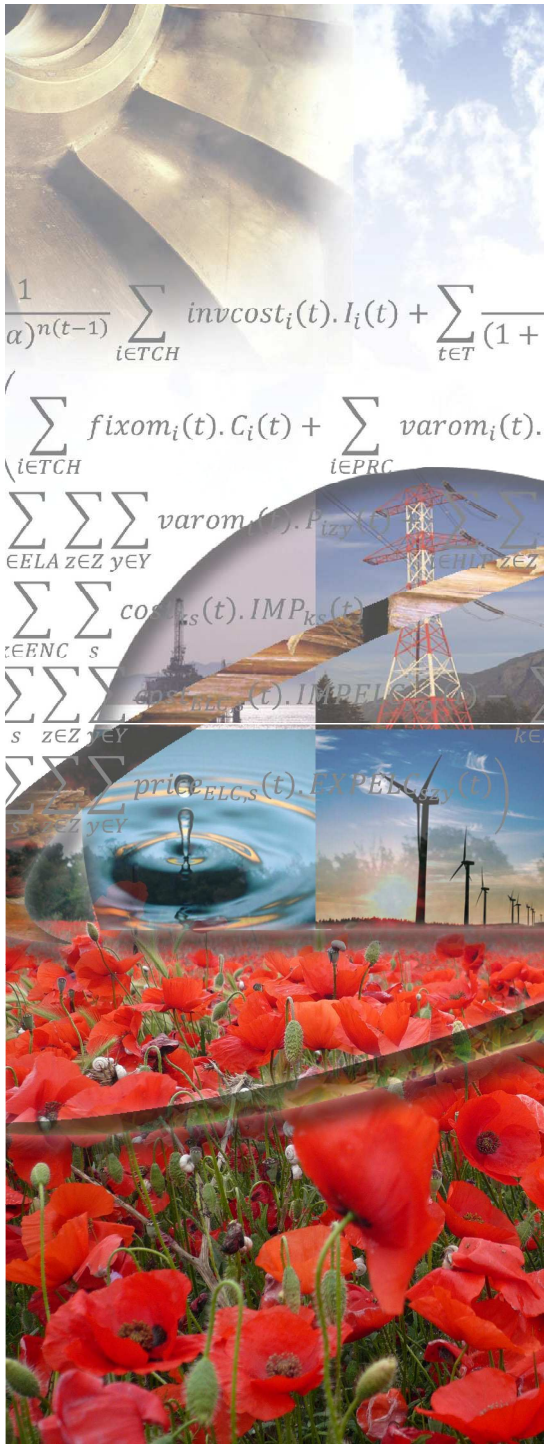


Prospective analysis with technology oriented models for long term energy assessment

Low carbon development and energy access in Africa

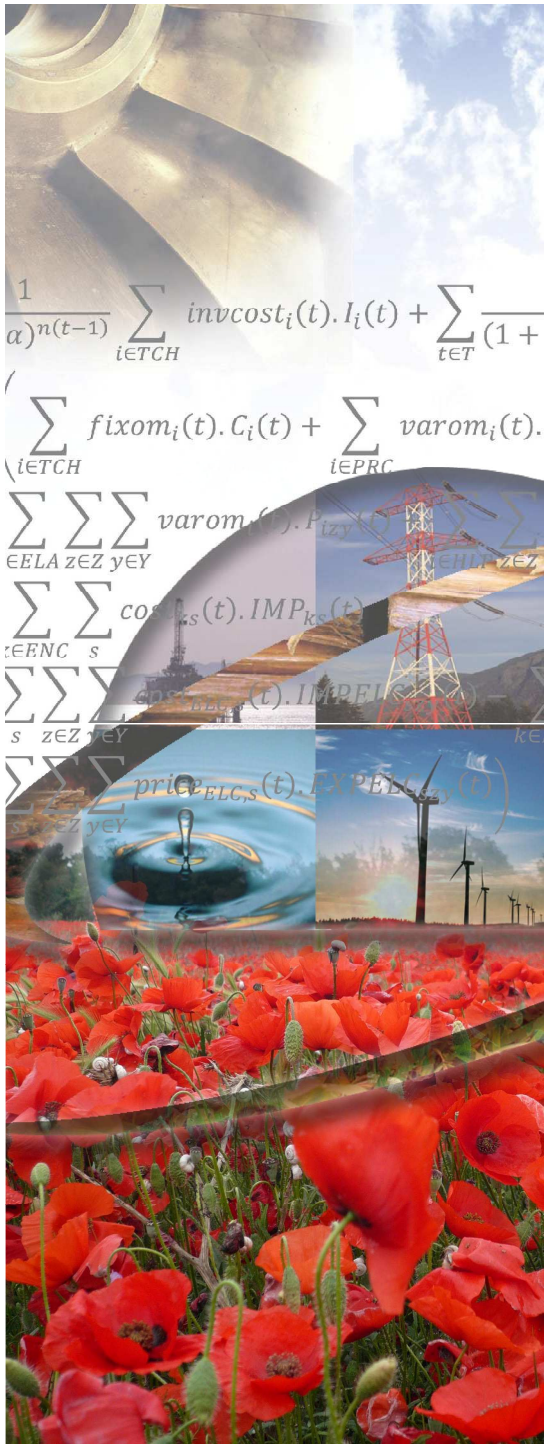
African Pavillon – COP 17 Durban

Edi Assoumou et al.

6 Decembre 2011

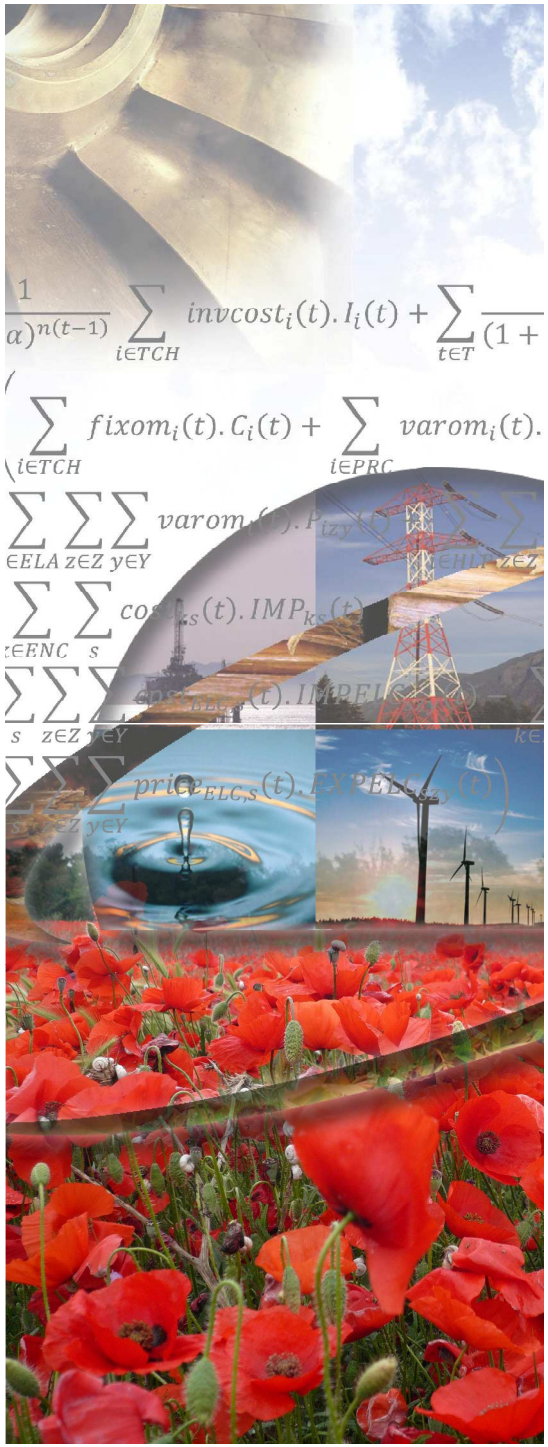
Chair Modeling for Sustainable Development

ParisTech
INSTITUT DES SCIENCES ET TECHNOLOGIES
PARIS INSTITUTE OF TECHNOLOGY

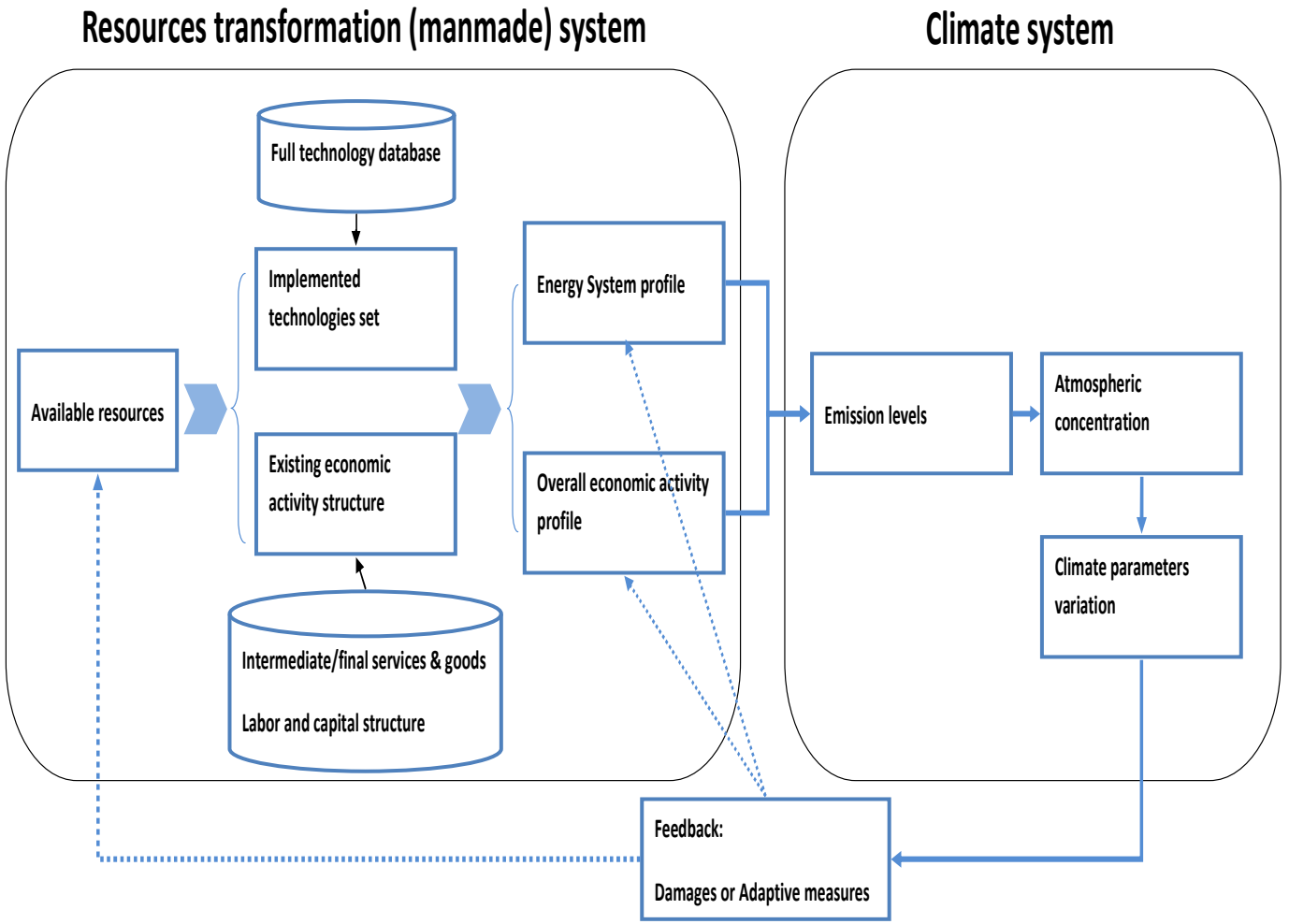


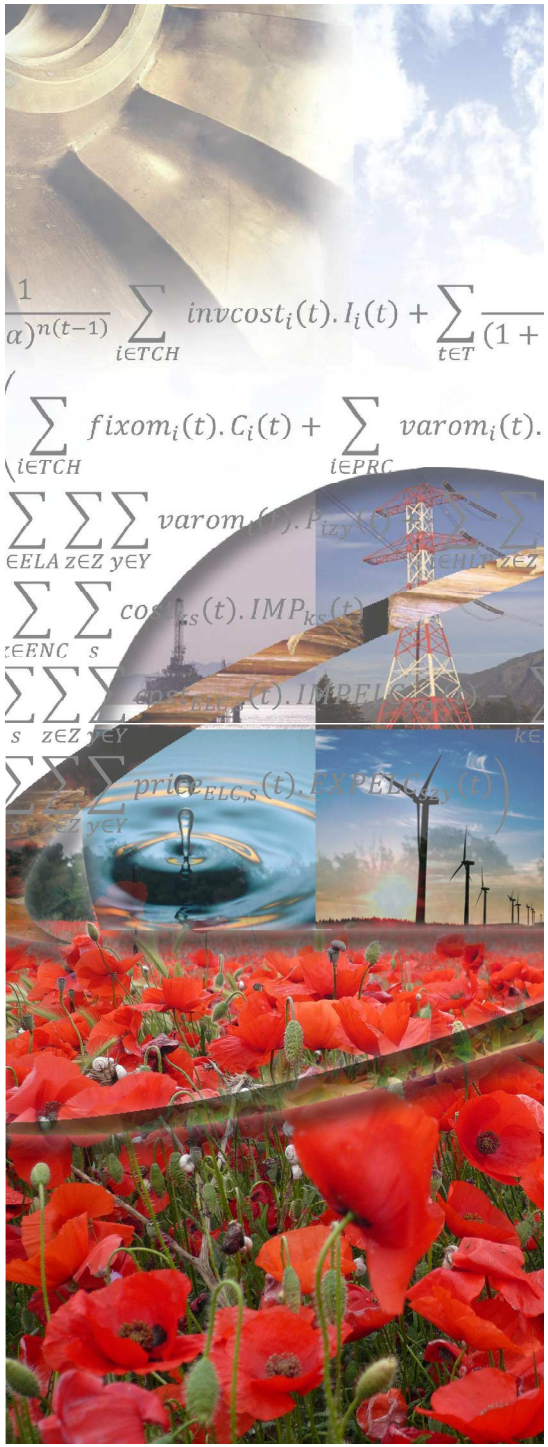
Why prospective models matter to sustainable development?

- Catch the systemic relations between different subsystems (sectors, regions, countries)
- More detailed models for tailored insights: downscaling world level studies
- Decision support tool for a problem that gets more complex
- Knowledge production



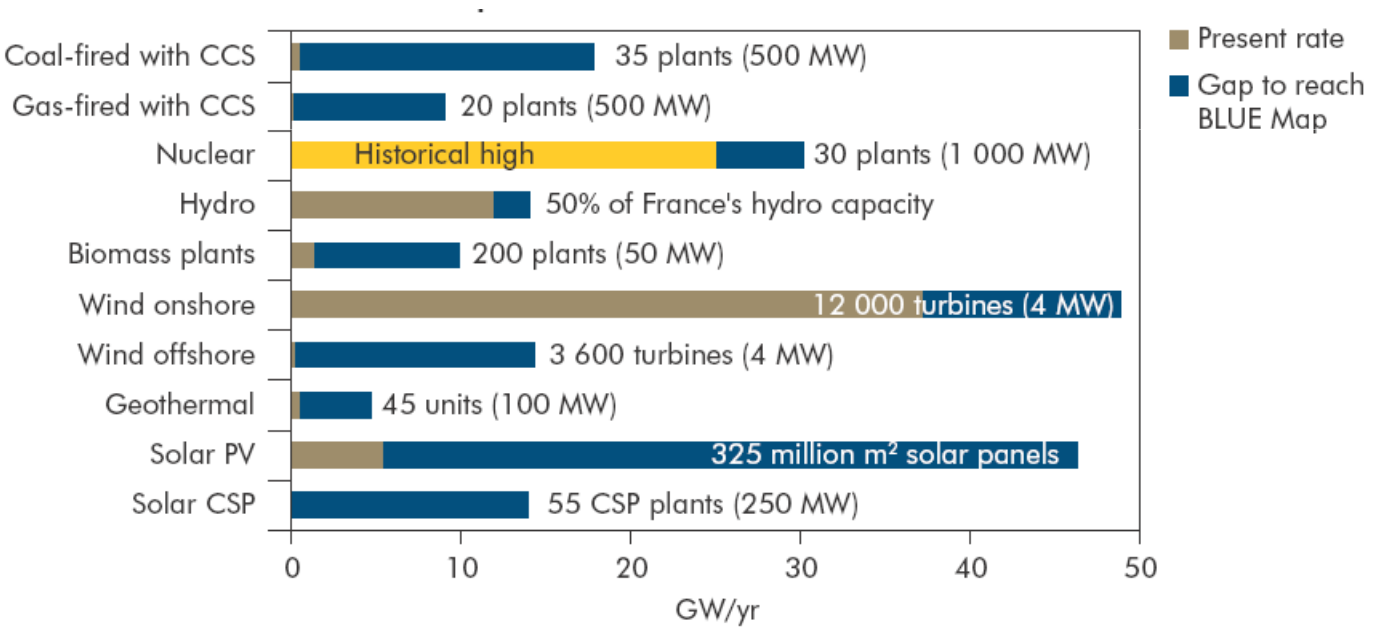
Linking systems and subsystems



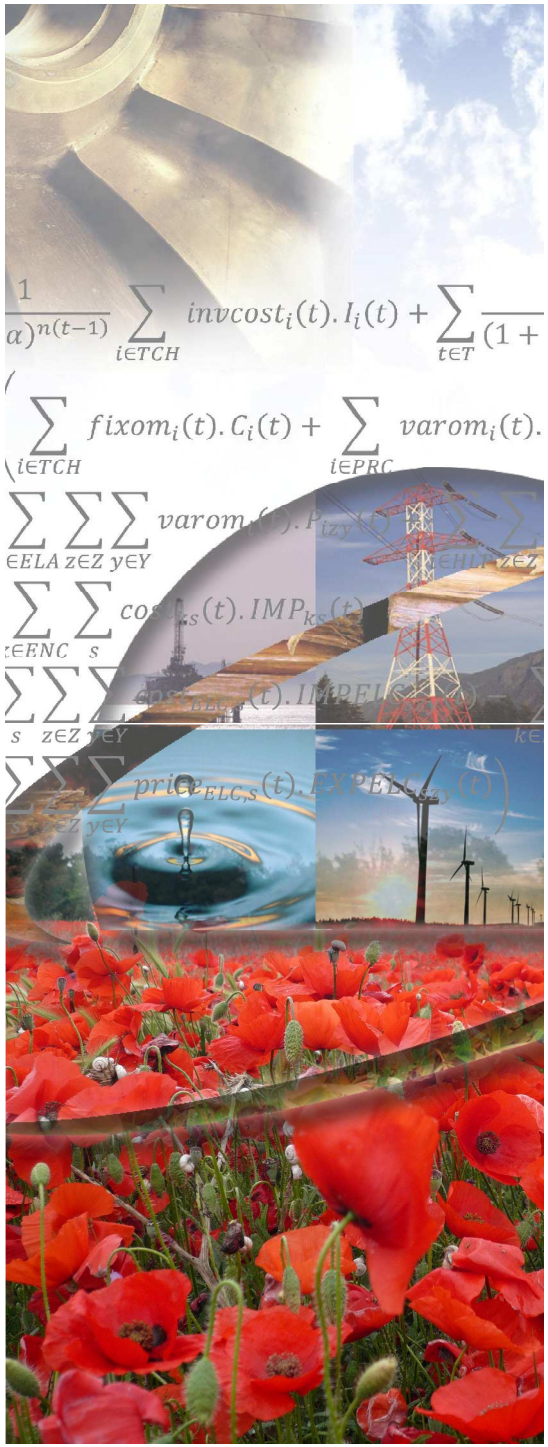


Why technology oriented models?

- Finding the right technology mix is crtitical

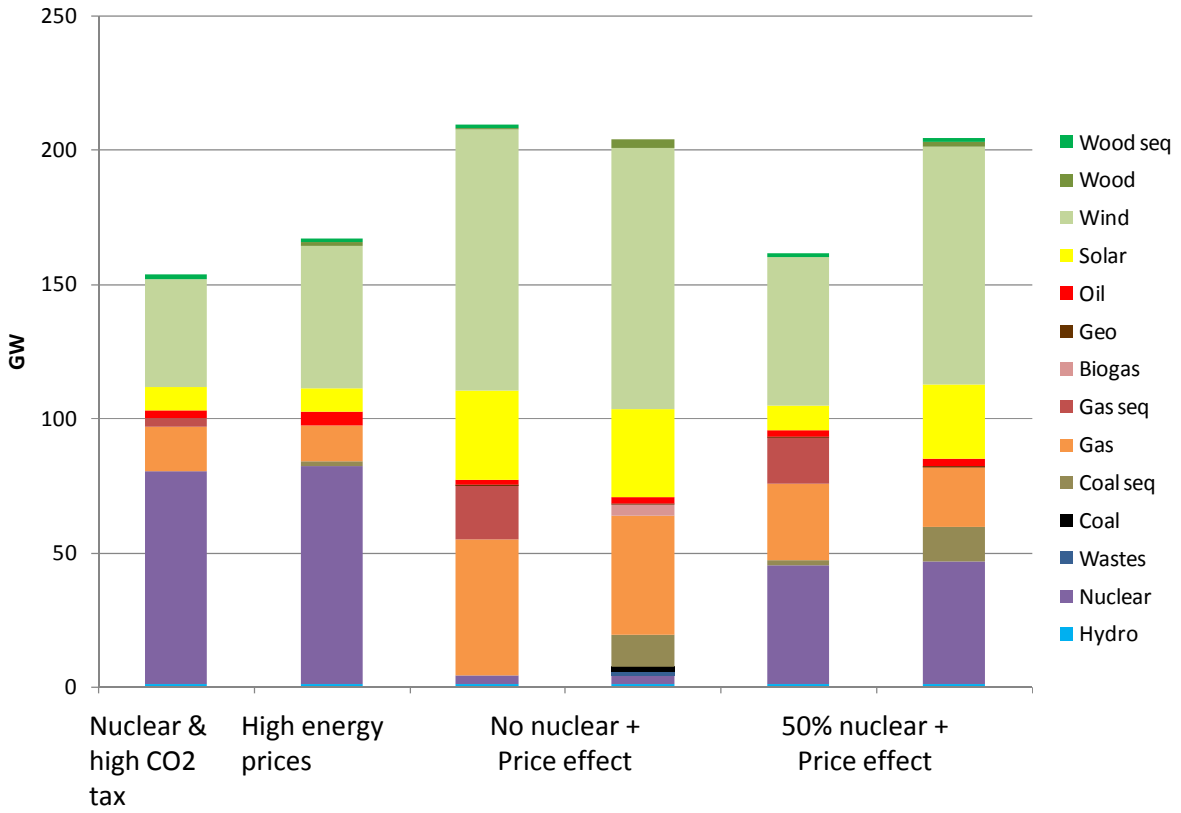


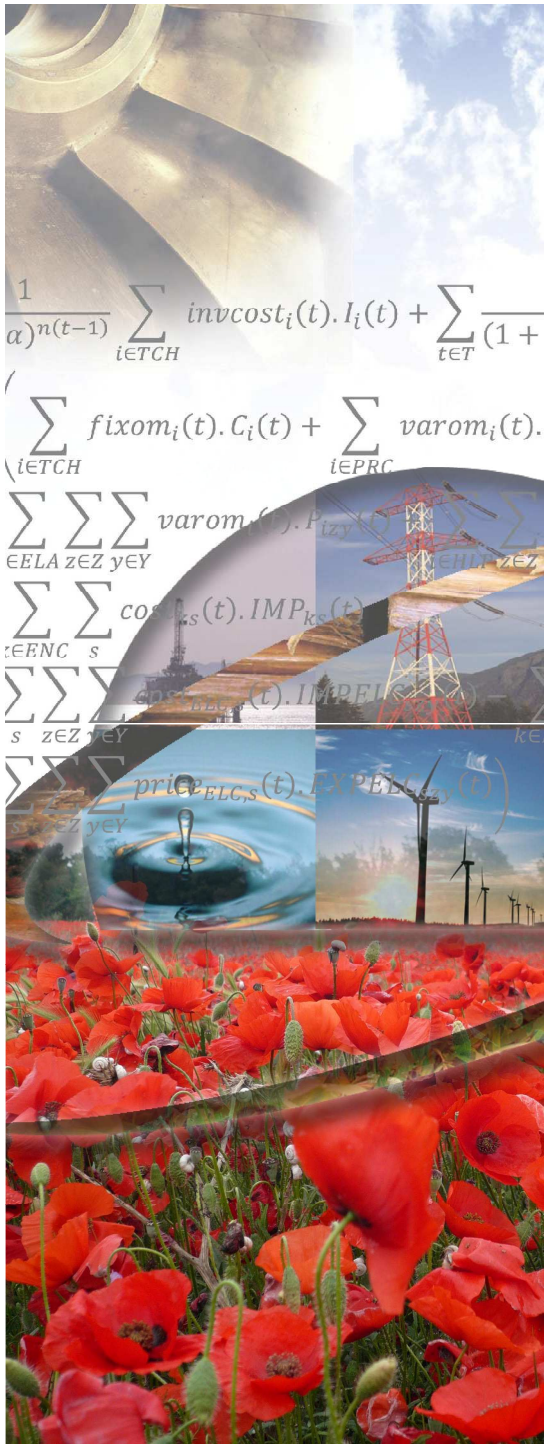
Source: IEA ETP 2010



Why technology oriented models?

- Example of alternative technology pathway



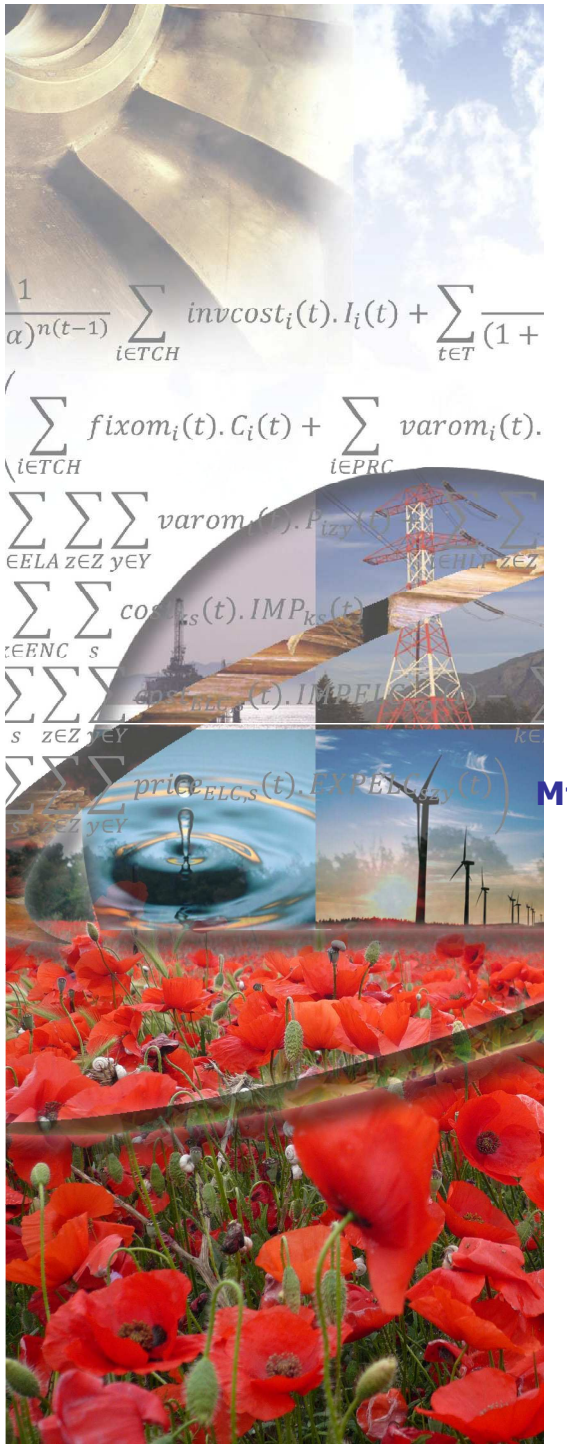


Our modeling principle

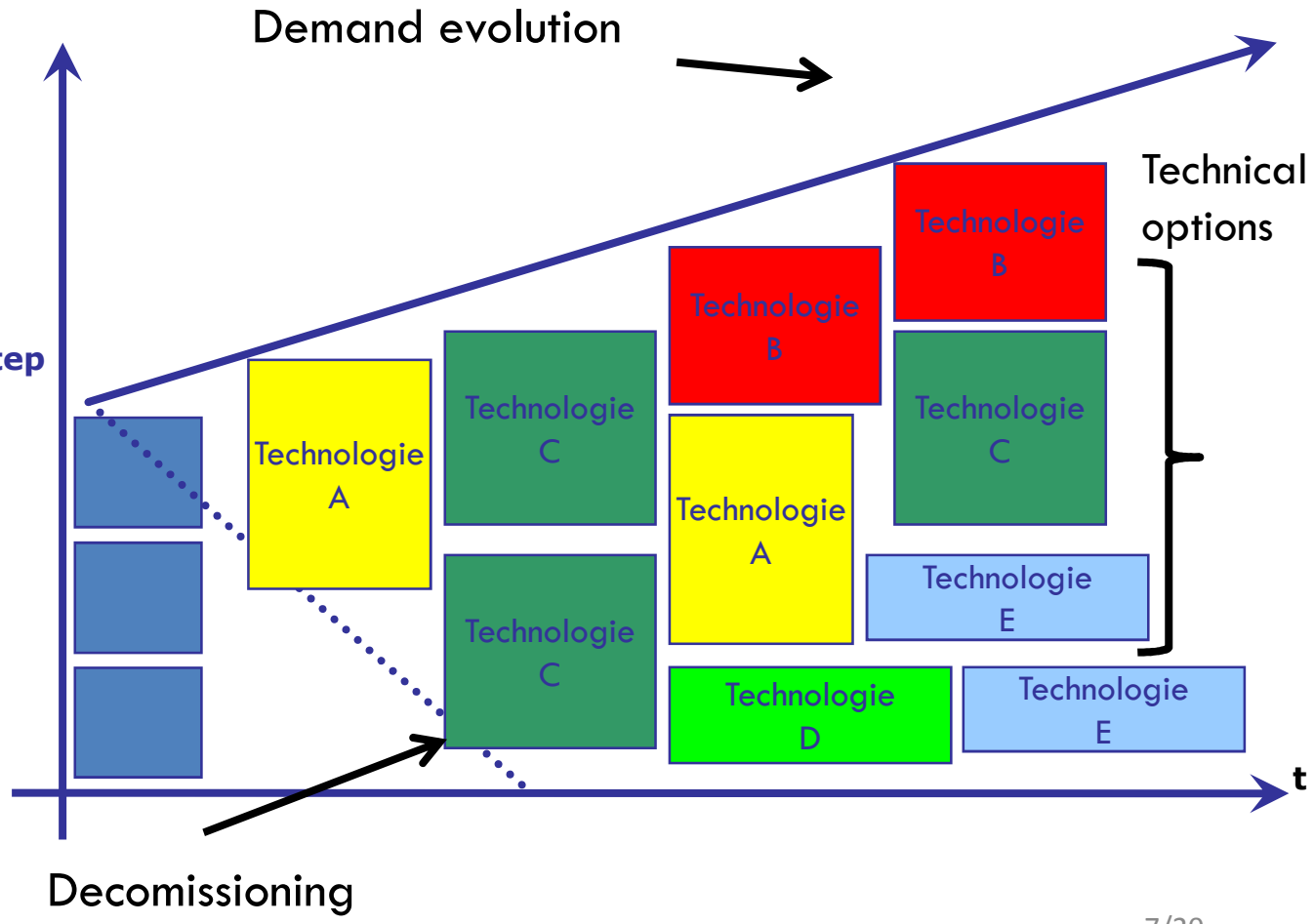
- Total discounted cost minimisation under constraints
- Based on TIMES model generator
- Technologies as basic subsystem

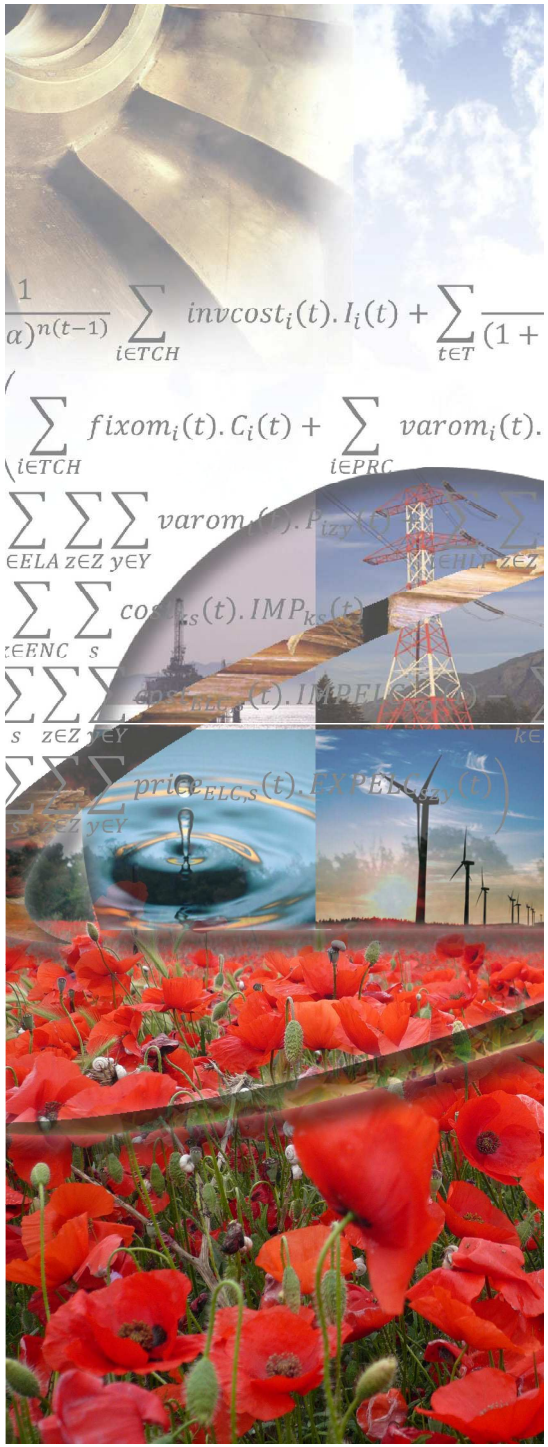
Process parameters

Existing past investments (stock)
Investment cost
Fixed operation and maintenance costs
Variable operation and maintenance costs
Commodity based efficiencies
Availability factor
Emission factor
Life
Starting year
Decommissioning costs…



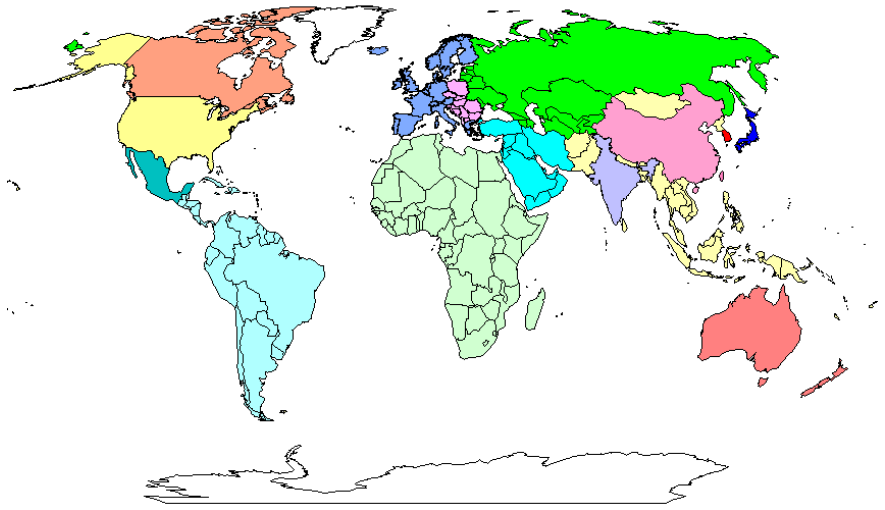
Our modeling principle

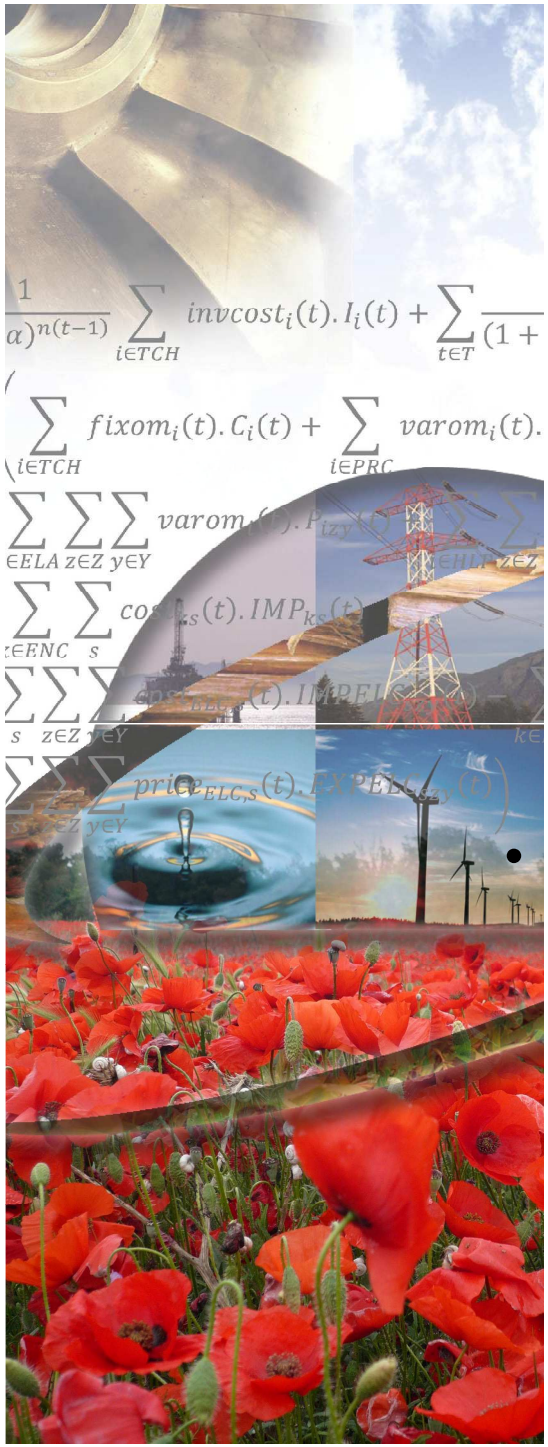




Case study: Insight on Climate negotiation

- Industrial/fast developing/ developing countries perspective
- S. Selosse, Nadia Maïzi, Edi Assoumou
- World model TIAM-FR (french version of the ETSAP-TIAM model): 15 regions
- Multisectoral

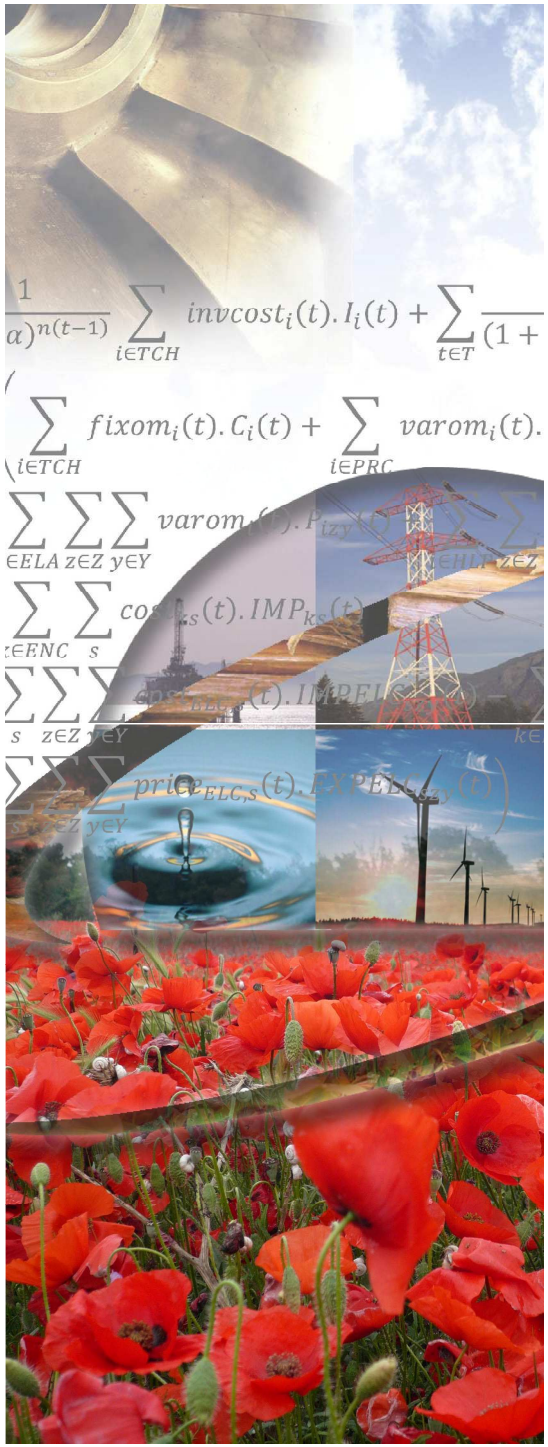




Case study: Insight on Climate negotiation

2°C objective expressed since COP15 induces CO_2 mitigation policies which involve transformation of the world energy system and technological options

- **Effectiveness of climate policy**
  - Will promised emissions reductions be sufficient?
  - Will a wider participation be required?
- **Evolution of the energy system**
  - What will be the future energy mix?
  - What technological choices?
- **Developed and developing countries perspectives**
  - What shares of contribution?



Case study: Insight on Climate negotiation

A global scenario in line with the 2°C objective : **Glob50**

Limiting the world CO_2 emissions to 50% in 2050 by comparison with 2000

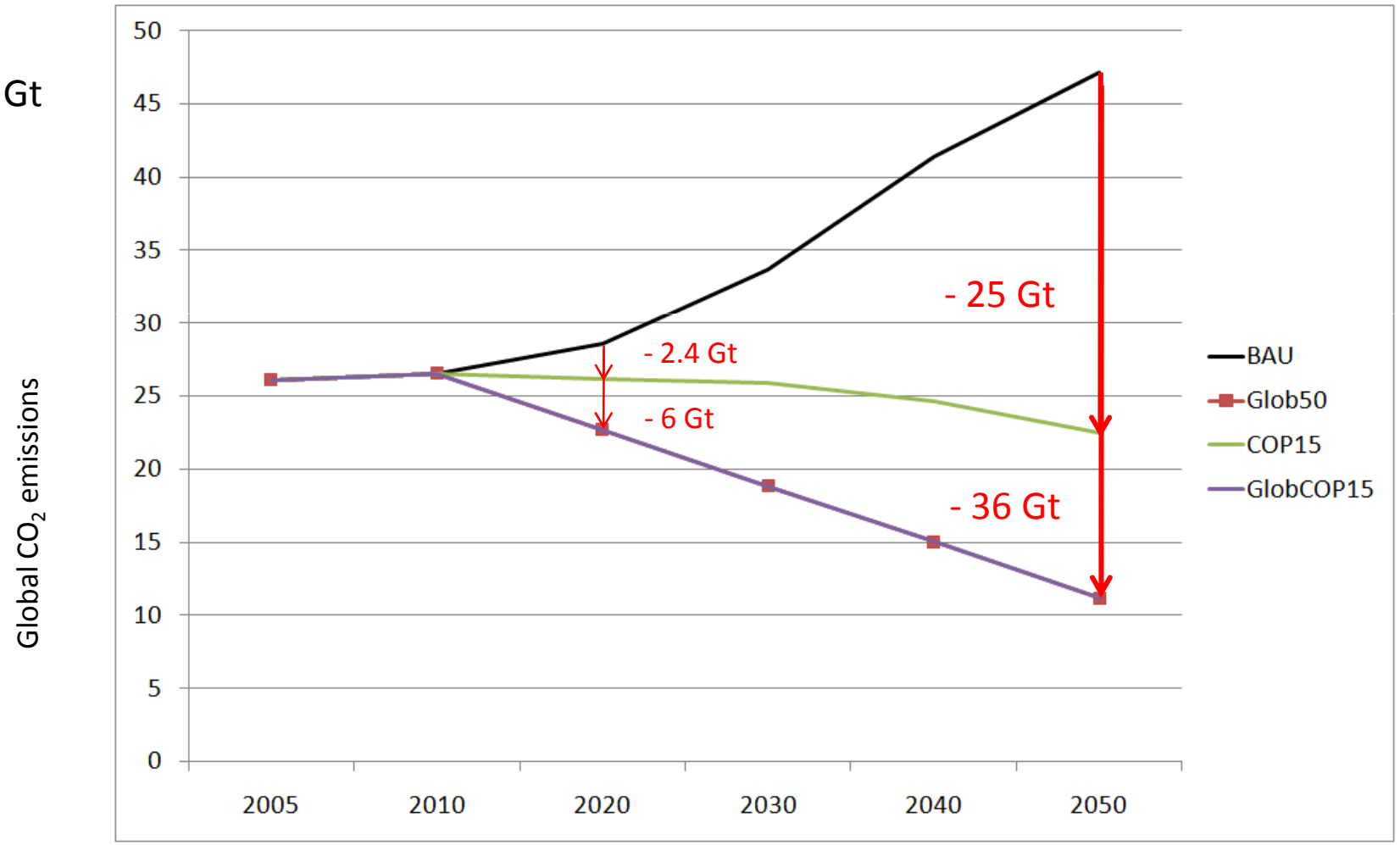
A regional scenario considering post COP15 pledges in 2020 and assuming new targets for 2050: **COP15**

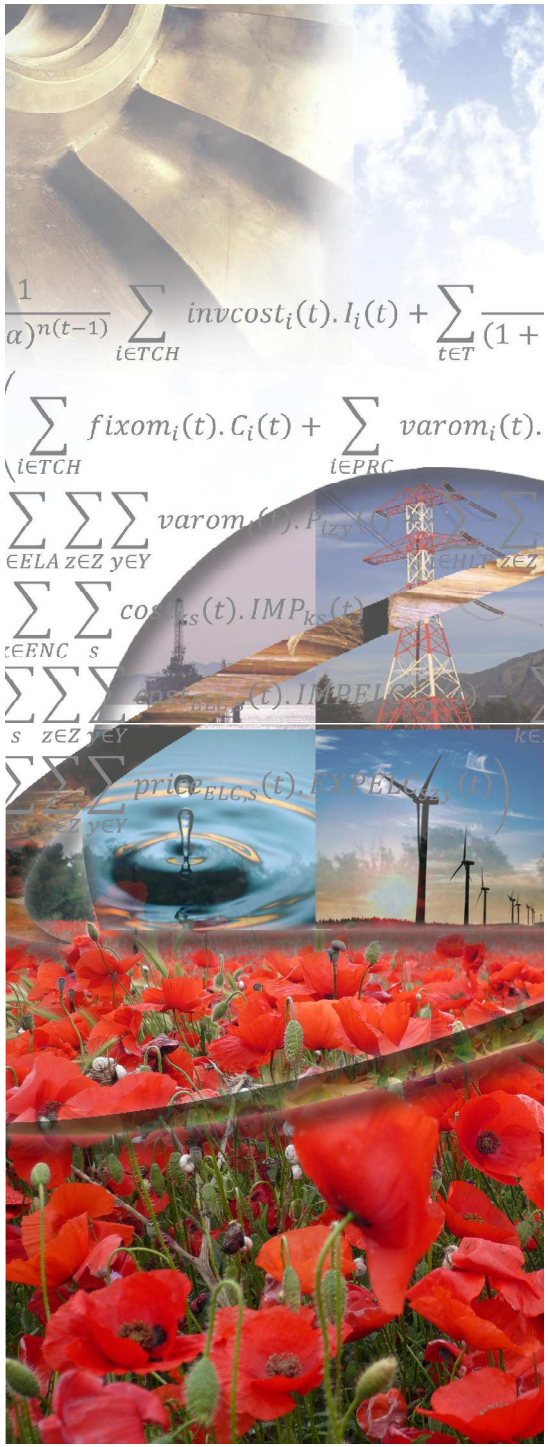
The lower CO_2 mitigation targets by 2020 expressed by Europe, the USA, Australia, Canada, Japan, China and India and assumptions in 2050 representing the international convergence in terms of mitigation

A coupled regional and global scenario: **GlobCOP15**

COP15 coupled with Glob50

- COP 15 pledges expressed here are not sufficient to reach the global UNFCCC objective
- A wider CO_2 mitigation is required but by who?





Case study: Insight on Climate negotiation

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A coupled regional and global scenario: **GlobCOP15**

COP15 coupled with Glob50

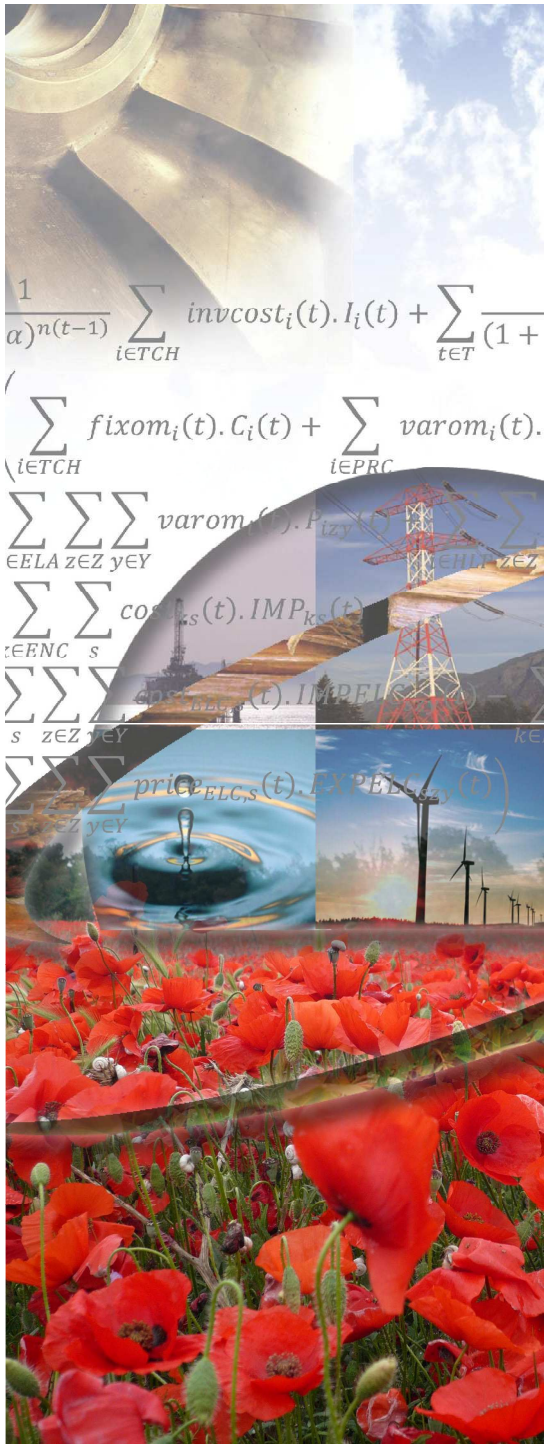
Regional distribution of CO_2 emissions (Gt CO_2) and avoided CO_2 (by comparison with BAU)

Period	Scenario	Industrialized countries (AUS, CAN, EEU, JPN, USA, WEU)		Fast developing countries (CHI, IND)		Developing countries (AFR, CSA, FSU, MEA, MEX, ODA, SKO)	
		CO2 level	Avoided CO2	CO2 level	Avoided CO2	CO2 level	Avoided CO2
2020	BAU	11,6		7,9		9,1	
	COP15	**9,5**	**2,1**	**7,5**	**0,4**	**9,2**	**-0,1**
	Glob50	**10,1**	**1,6**	**6,5**	**1,4**	**6,2**	**2,9**
	GlobCOP15	**9,4**	**2,2**	**6,9**	**1,0**	**6,3**	**2,8**
2050	BAU	14,5		17,9		14,7	
	COP15	**2,2**	**12,3**	**5,3**	**12,6**	**14,9**	**-0,2**
	Glob50	**3,2**	**11,3**	**4,7**	**13,2**	**3,3**	**11,4**
	GlobCOP15	**2,0**	**12,5**	**4,8**	**13,1**	**4,4**	**10,3**

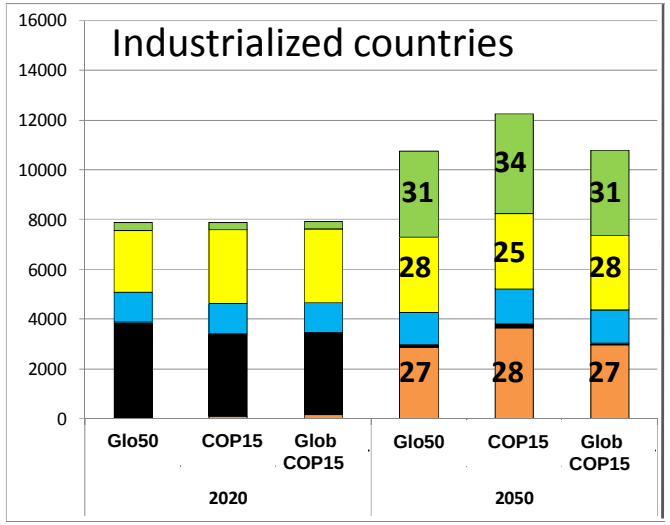
-70%

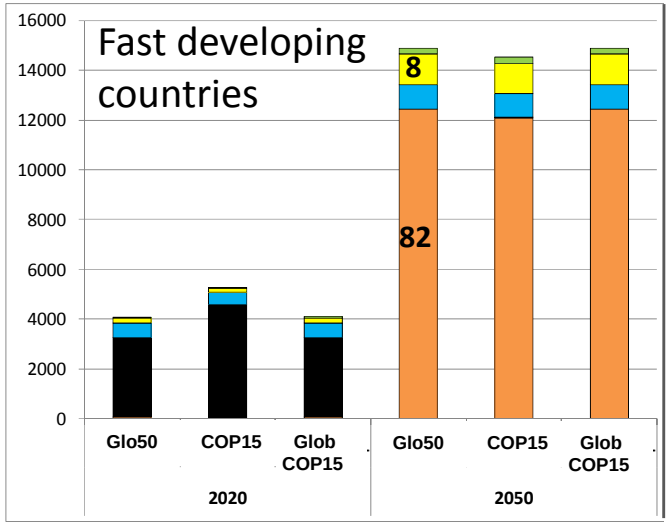
-77%

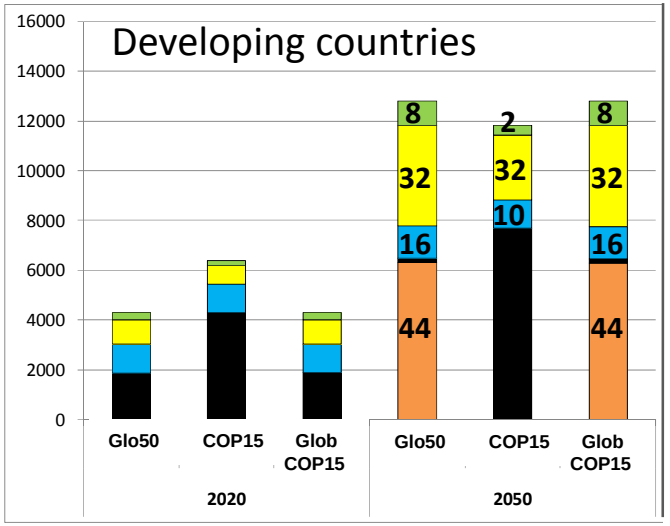
- Industrialized countries: Higher pledges than CO_2 emissions mitigation required by Global climate policy (flexibility mechanisms)
- Developing countries: -58% of CO_2 emissions reduction in 2050 by comparison with 2005 for Glob50 and -45% for GlobCOP15

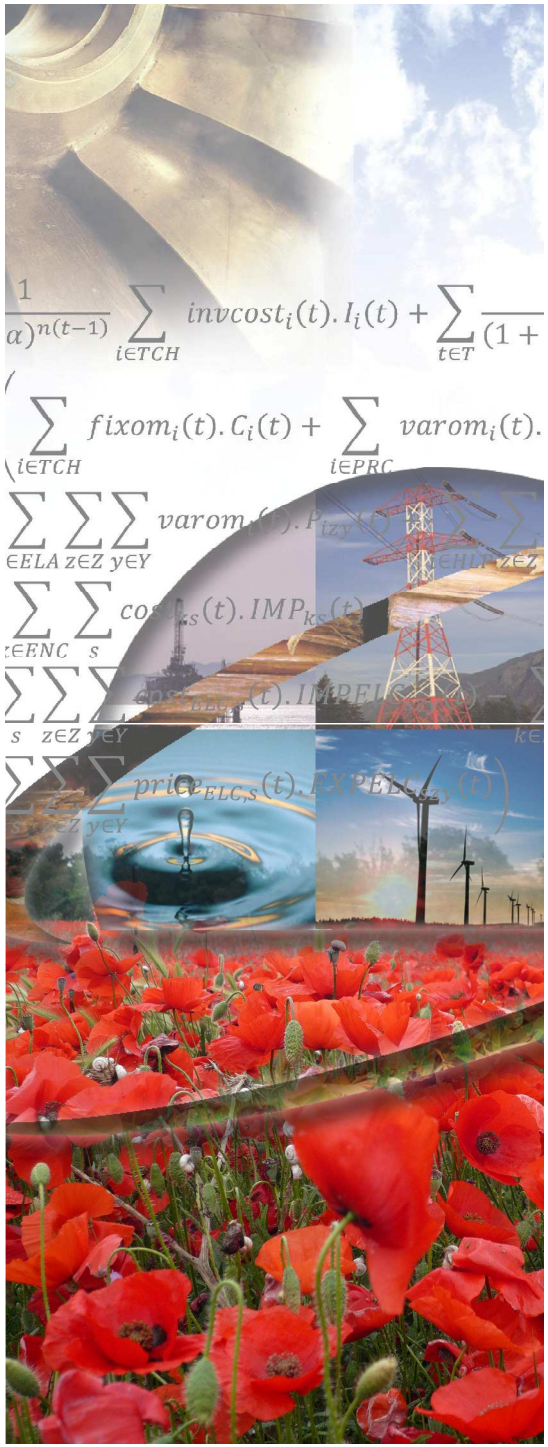


Technology insight: electricity production in TWh

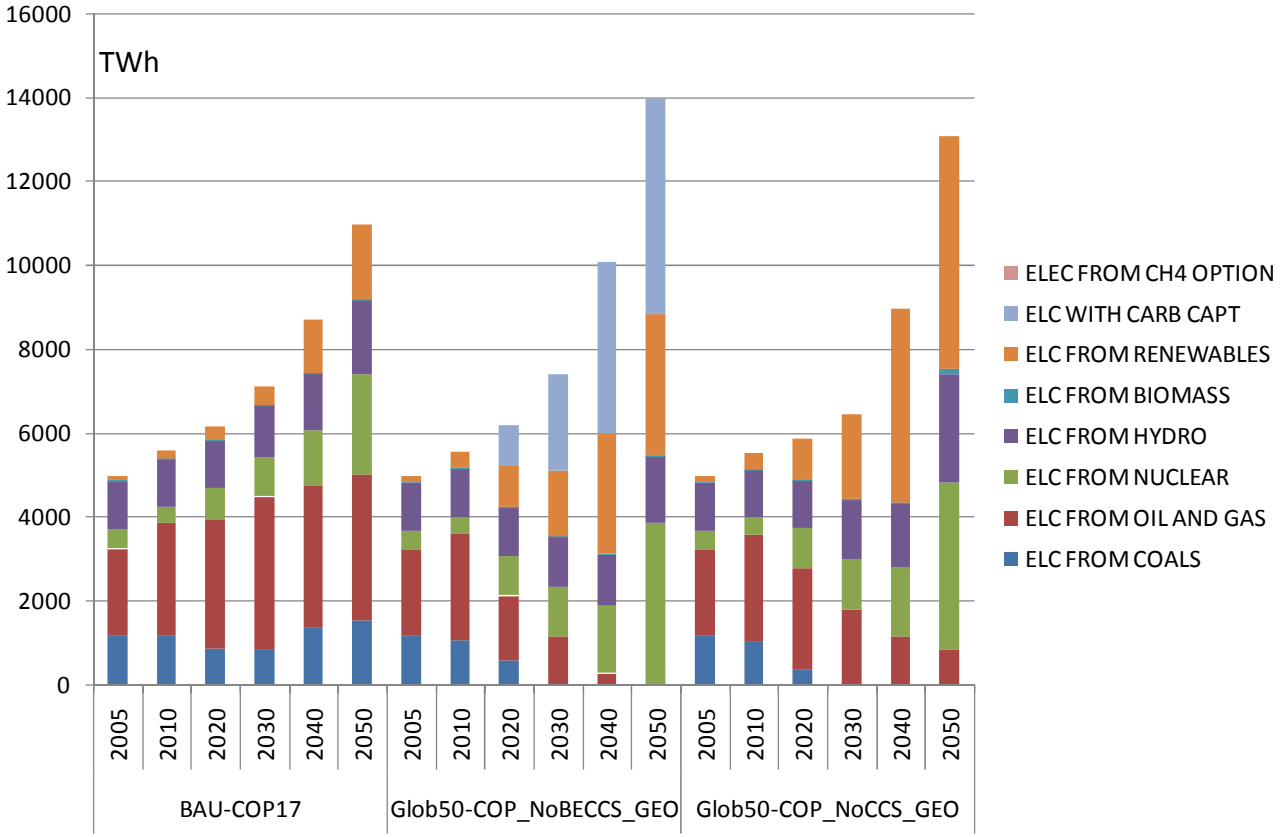




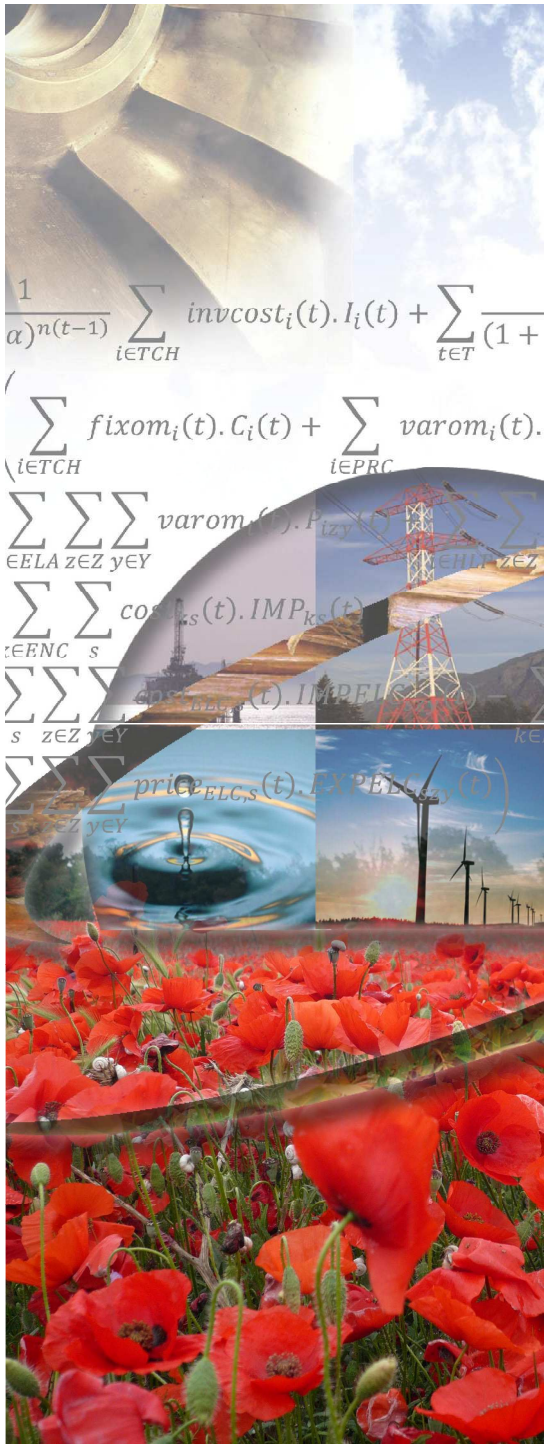




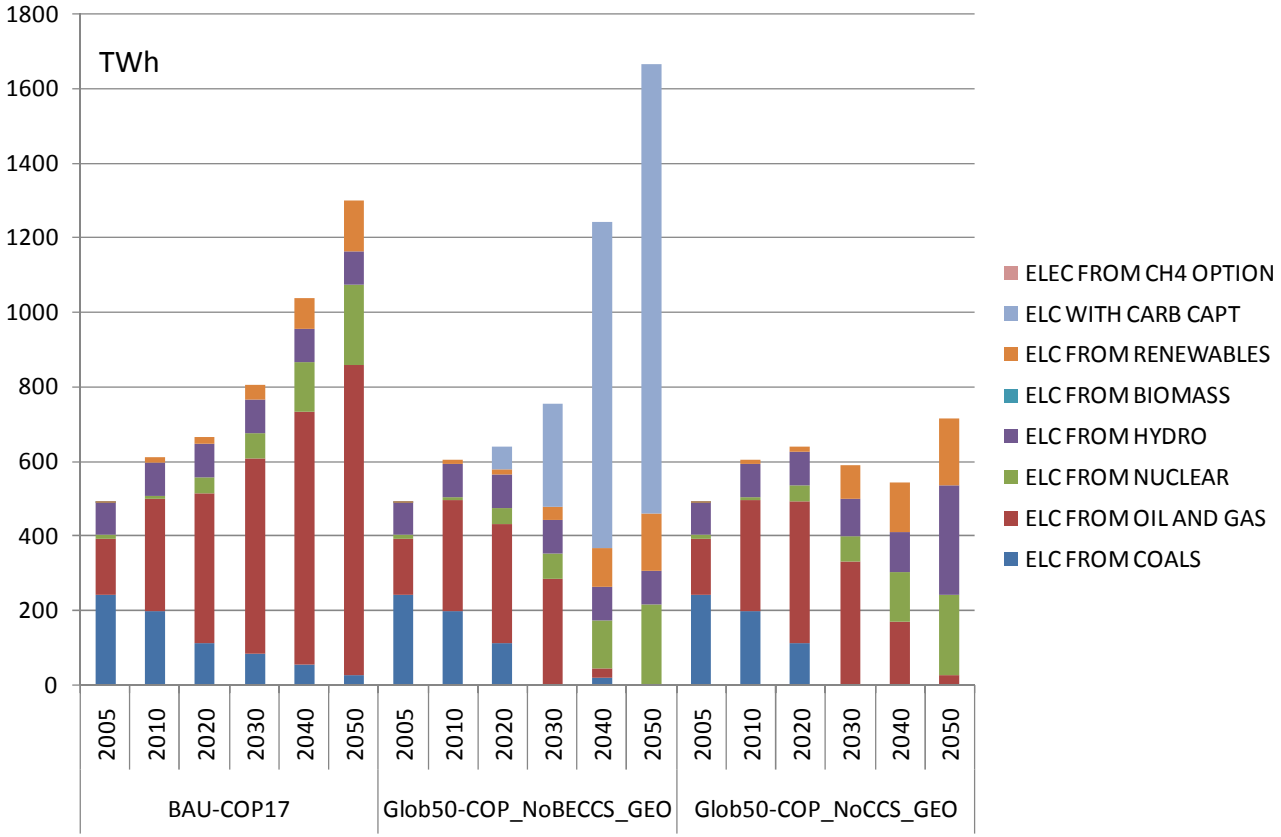
Technology insight: downscaling issues



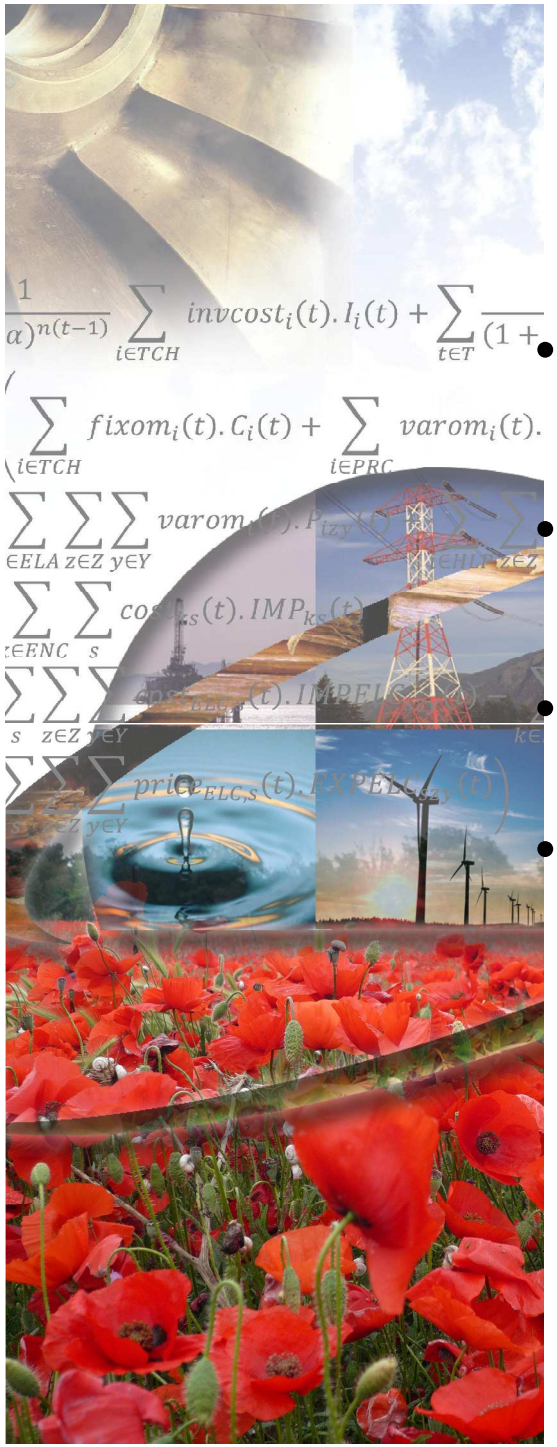
- Fast developing countries



Technology insight: downscaling issues



- More downscaling: improvement are needed to really assess Africa's potential



Conclusion: building and improving tools for thinking together

- Prospective models are very usefull decision support tools for strategic planning
- Broadly used in Annex 1 countries and more and more use in china
- Without accurate diagnosis no accurate projection
- Several initiatives create the favorable context for larger use in Africa:
  - NECTAR
  - ATPS
  - Christine Heuraux, *L'électricité au cœur des défis africains*
  - Interesting work from cape town university:

Costing a 2020 target of 15% renewable electricity for South Africa