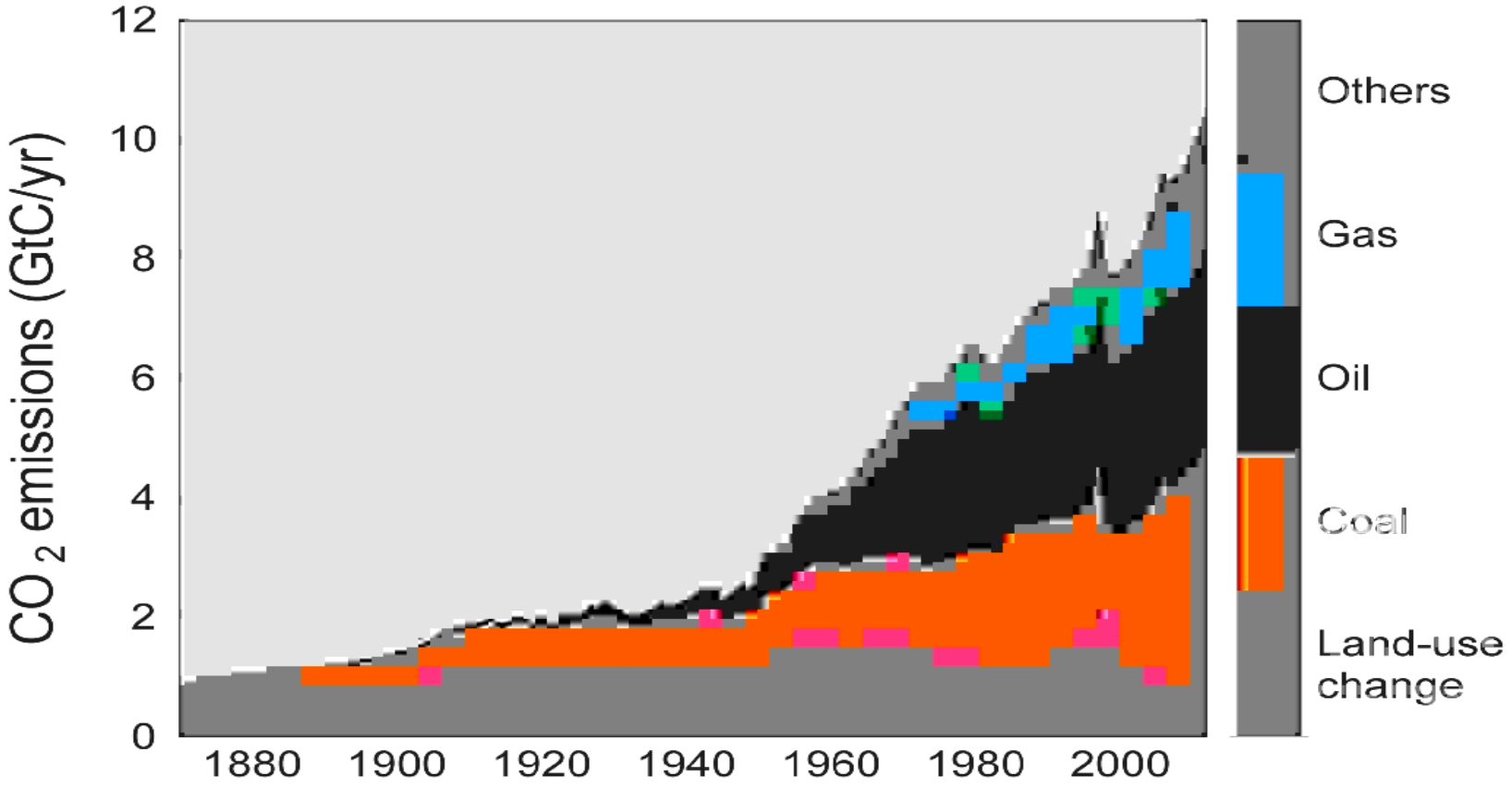
Figures de l’anhydride carbonique

Total Global Emissions of CO_2



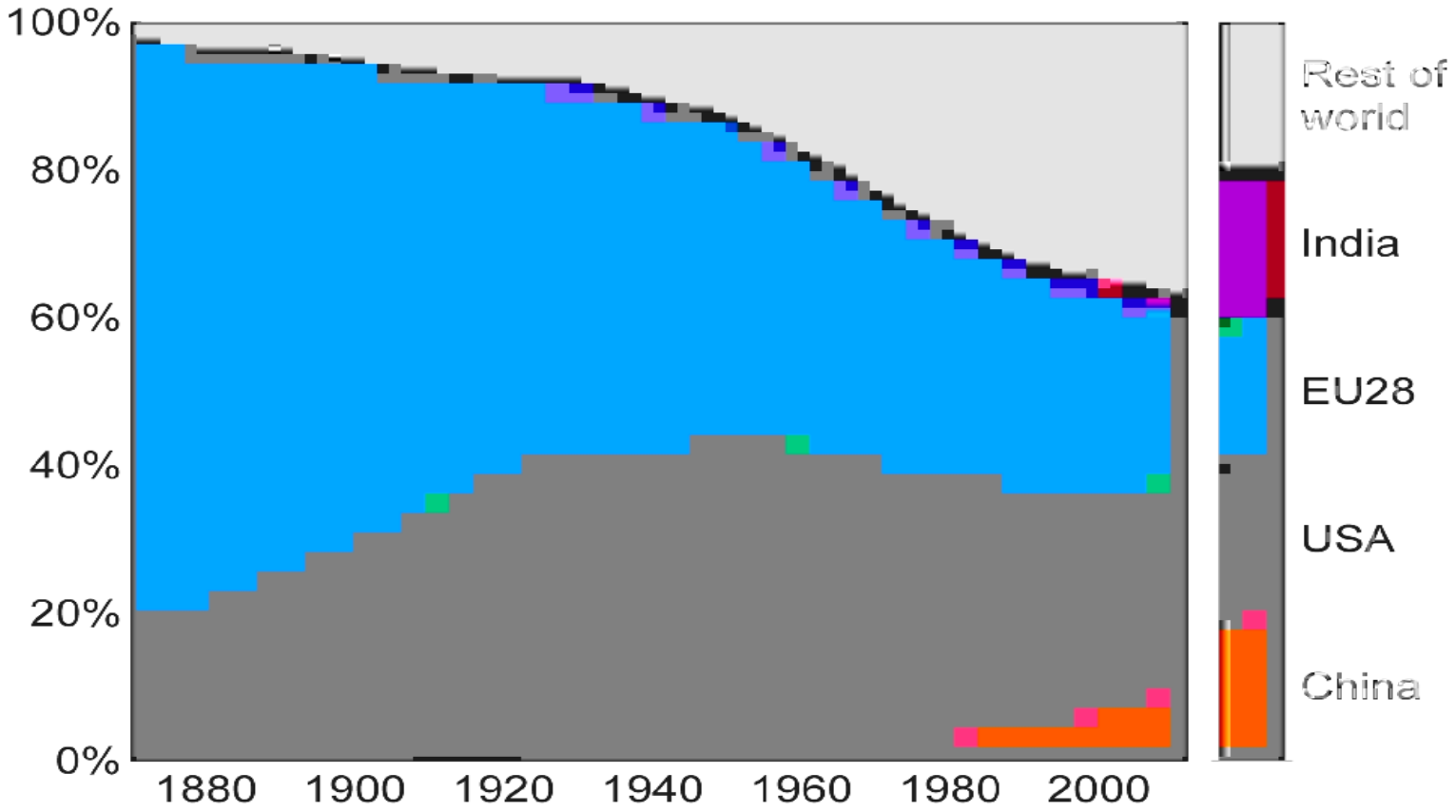
Others: Emissions from cement production and gas flaring.

Source: CDIAC Data; Houghton & Hackler (in review); Global Carbon Project 2013

Cumulative emissions from fossil-fuel and cement (1870–2012) :

USA (26%), EU28 (23%), China (11%), and India (4%) [64% of the total]

Cumulative emissions (1990–2012) :
USA (20%), EU28 (15%), China (18%), India (5%) [58% of the total]

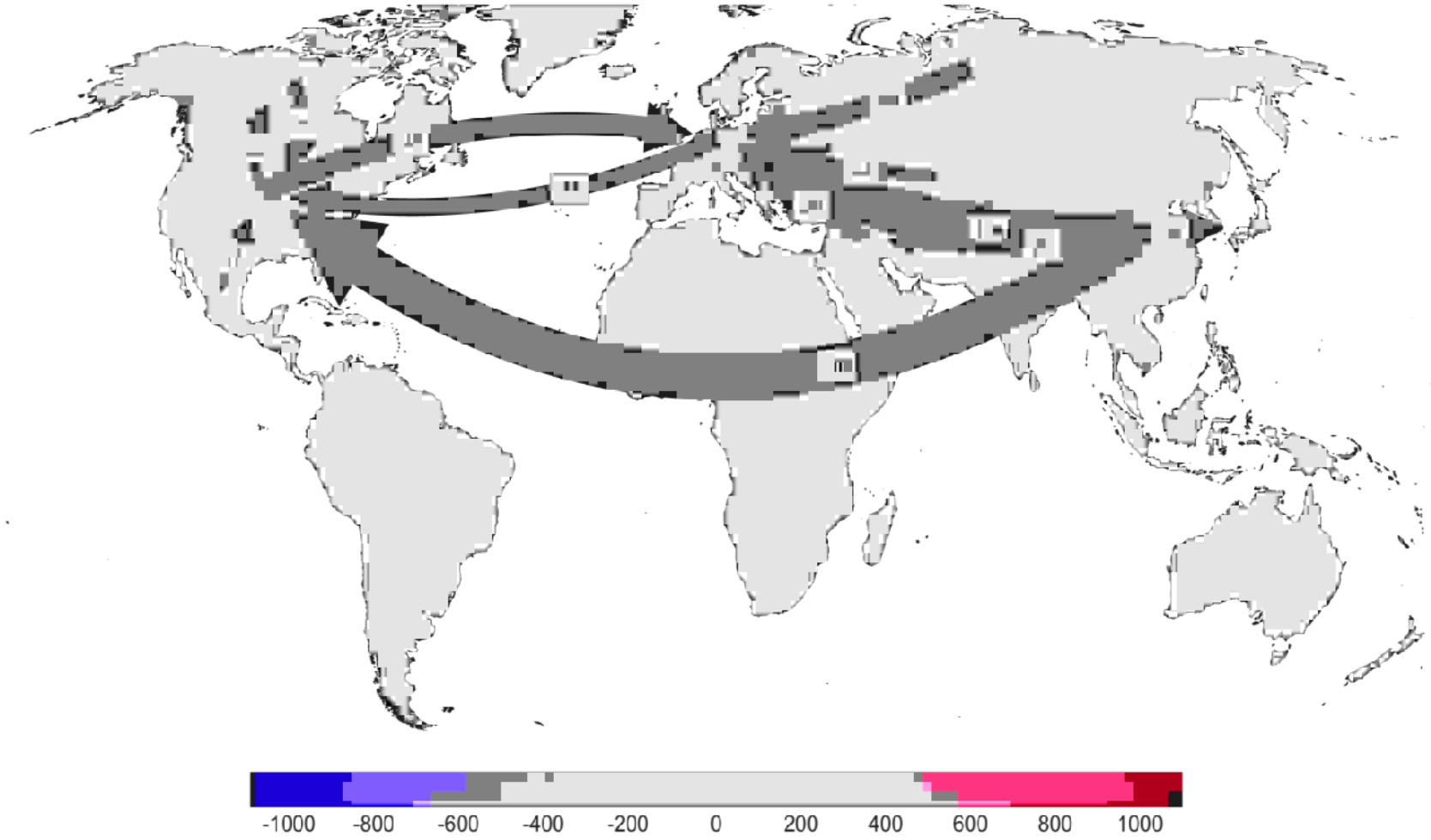


Source: CDIAC Data; Le Quéré et al 2013; Global Carbon Project 2013

Major Flows from Production to Consumption

Start of Arrow: fossil-fuel combustion

End of arrow: goods and services consumption



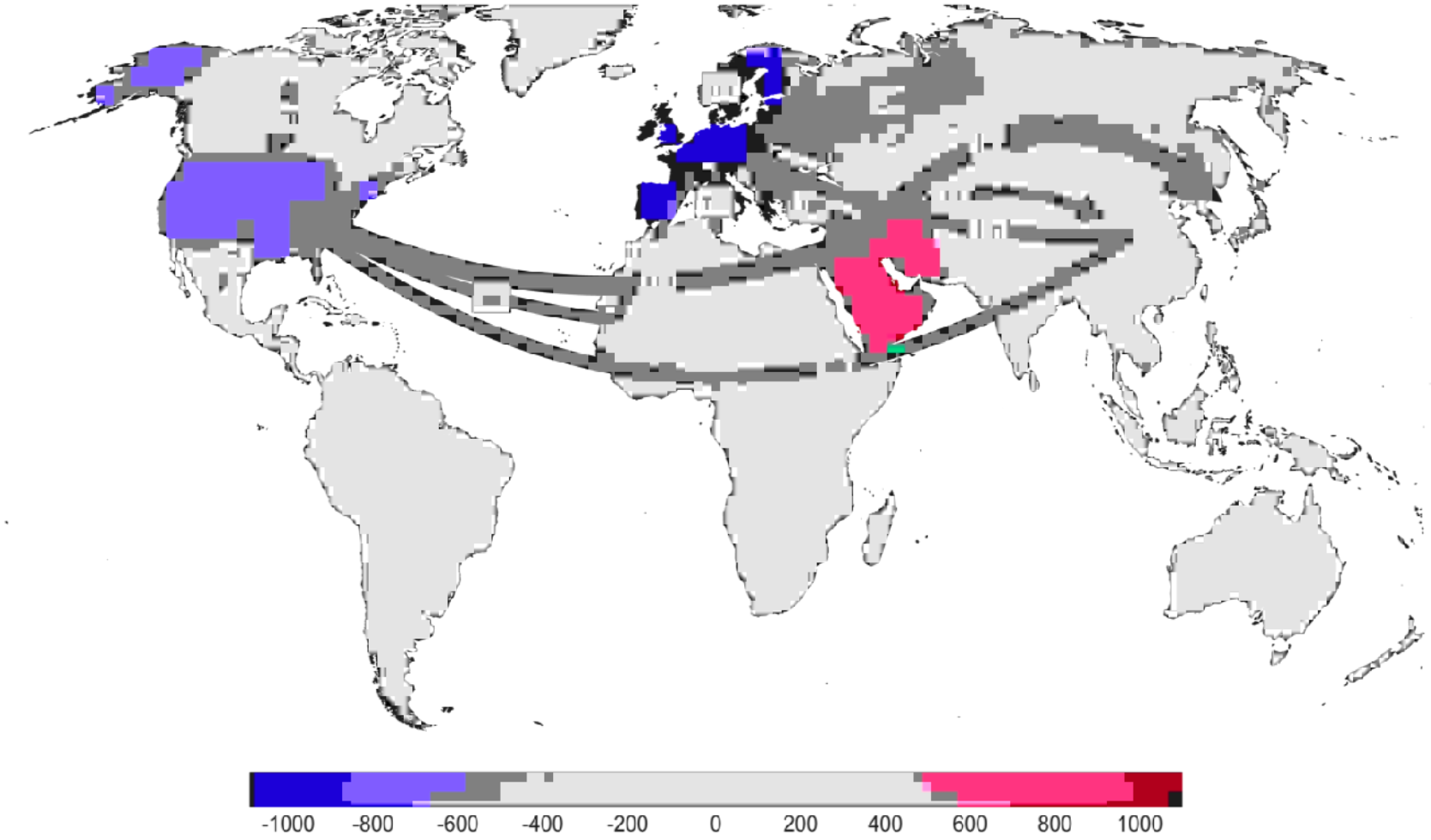
Values for 2007. EU27 is treated as one region. Units: TgC=GtC/1000

Source: Peters et al 2012b

Major Flows from Extraction to Consumption

Start of Arrow: fossil-fuel extraction

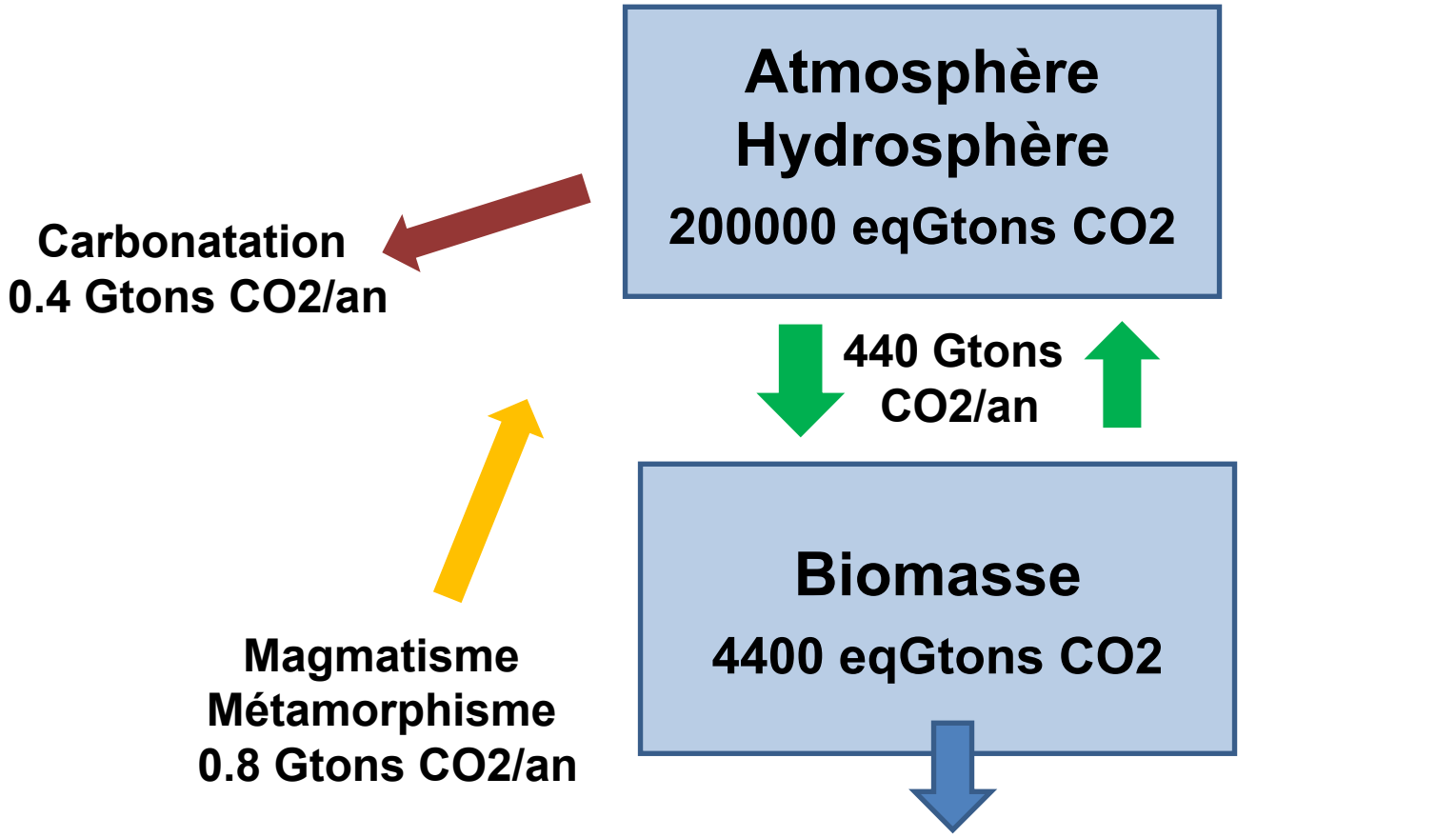
End of arrow: goods and services consumption



Values for 2007. EU27 is treated as one region. Units: TgC=GtC/1000

Source: Peters et al 2012b

Comment la nature régule-t-elle le CO_2 ?



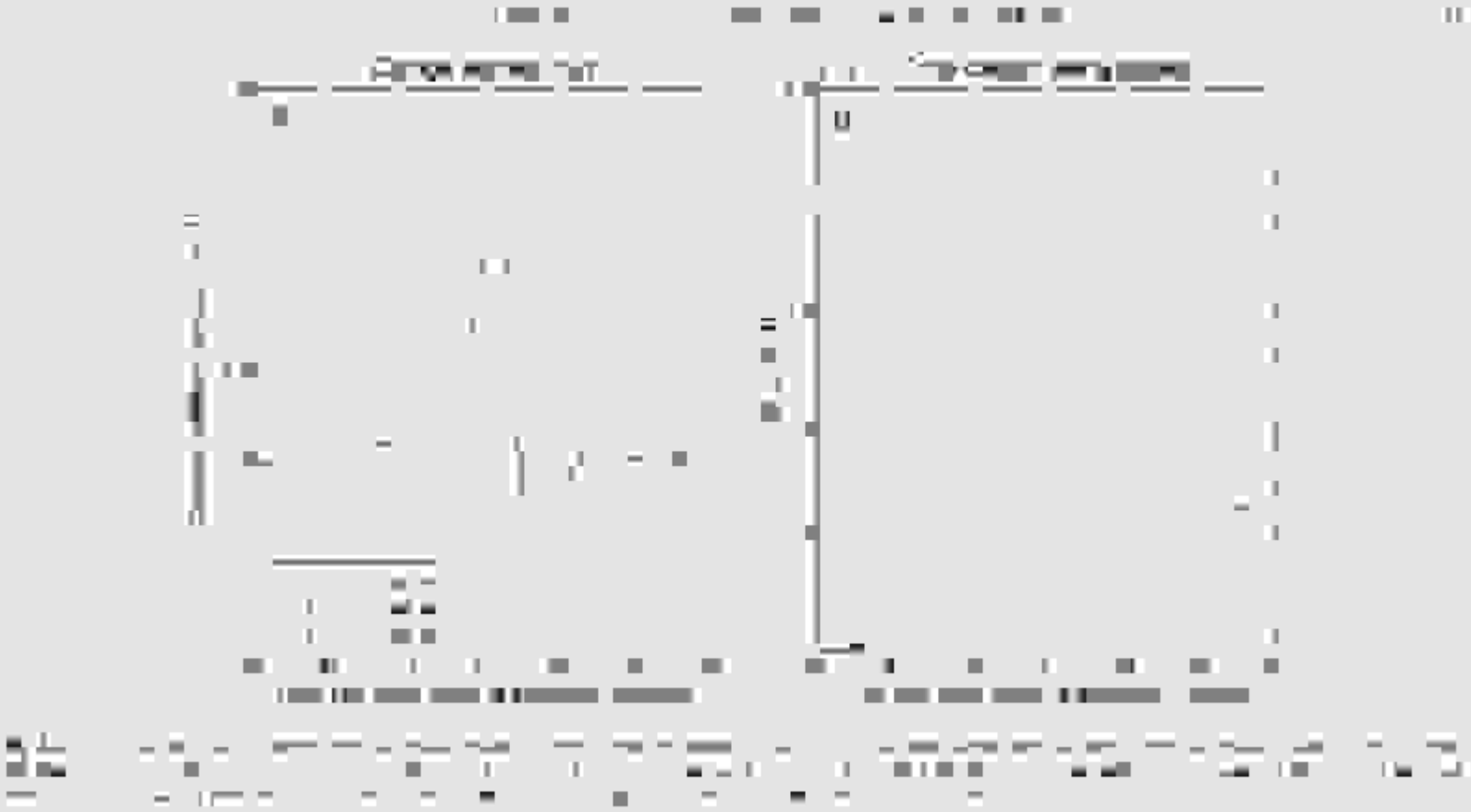
Exemples de déstabilisations du cycle du carbone

Impacts astéroïdaux ou cométaires majeurs

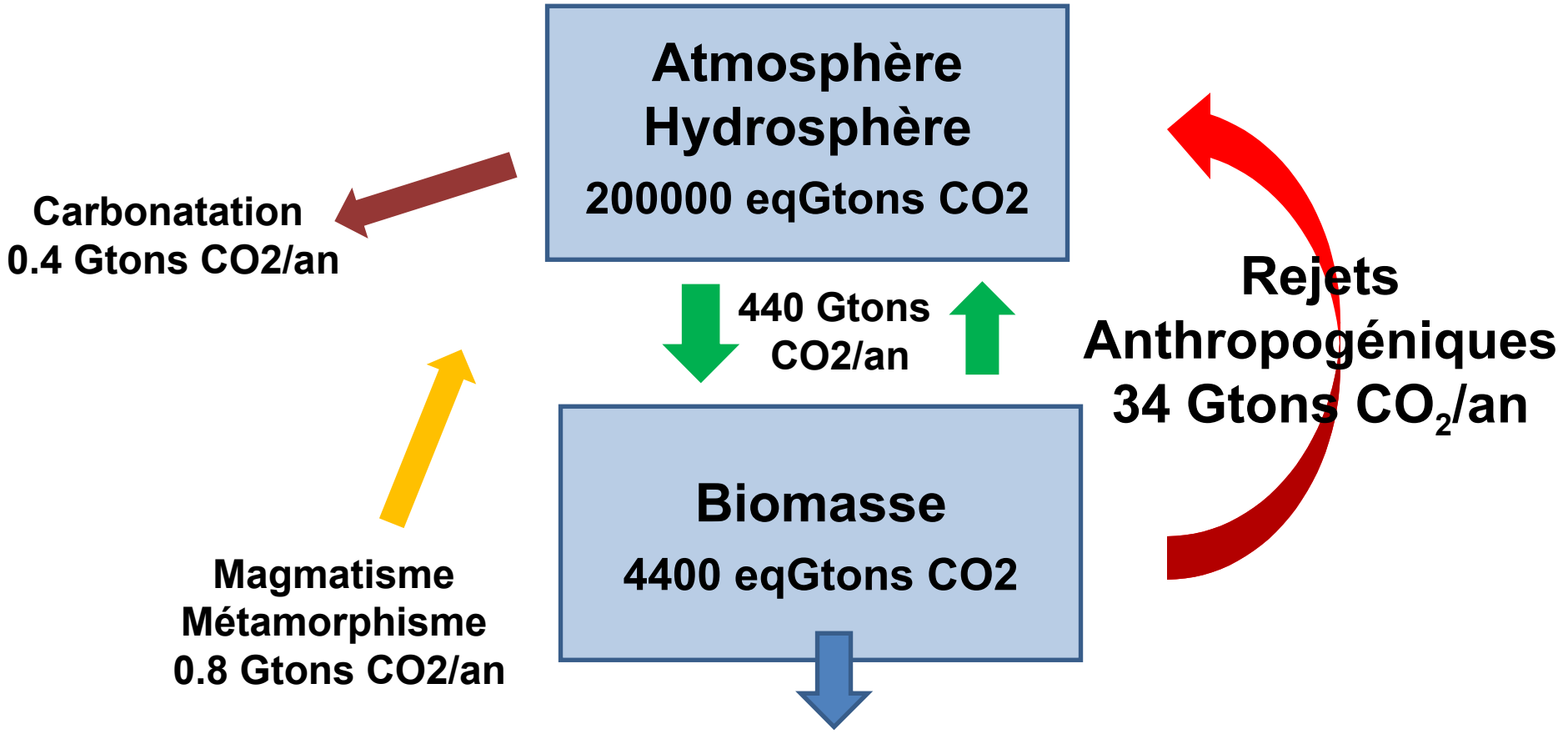
Volcanisme massif

Incendies très importants de biomasse

Combustion des combustibles fossiles



La combustion des combustibles fossiles est une crise géologique majeure

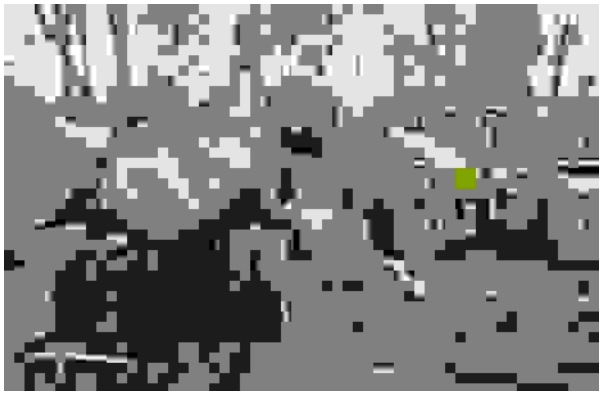


Sédimentation organique 0.4 Gtons CO2/an
Combustibles fossiles max 40000 eqGtons CO2
Accumulation 0.0004 eqGtons CO2/an

Fate of Anthropogenic CO_2 Emissions (2003-2012 average)

8.6 ± 0.4 GtC/yr 92%

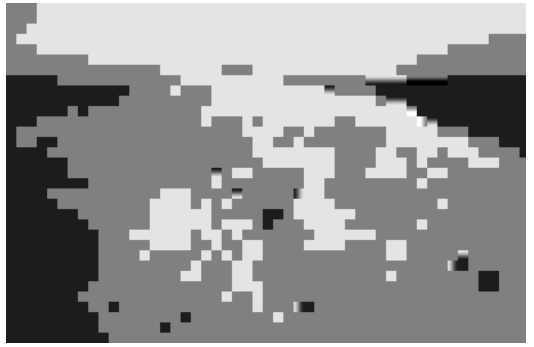
0.8 ± 0.5 GtC/yr 8%



+

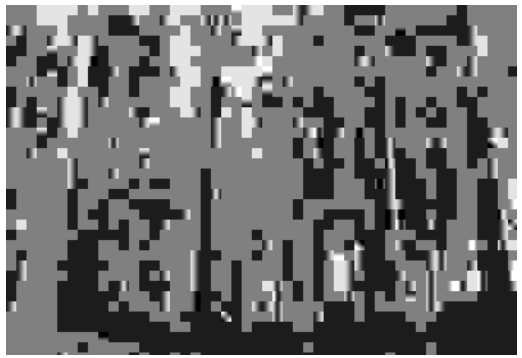
4.3±0.1 GtC/yr
45%

2.6 ± 0.5 GtC/yr
27%



2.6 ± 0.8 GtC/yr
27%

Calculated as the residual
of all other flux components

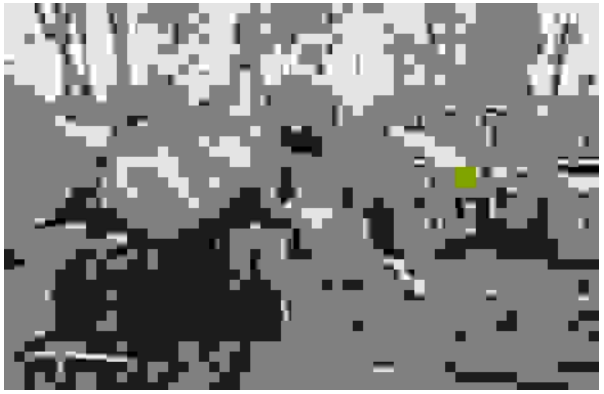


Source: Le Quéré et al 2013; CDIAC Data; Global Carbon Project 2013

Fate of Anthropogenic CO_2 Emissions (2003-2012 average)

8.6 ± 0.4 GtC/yr 92%

0.8 ± 0.5 GtC/yr 8%



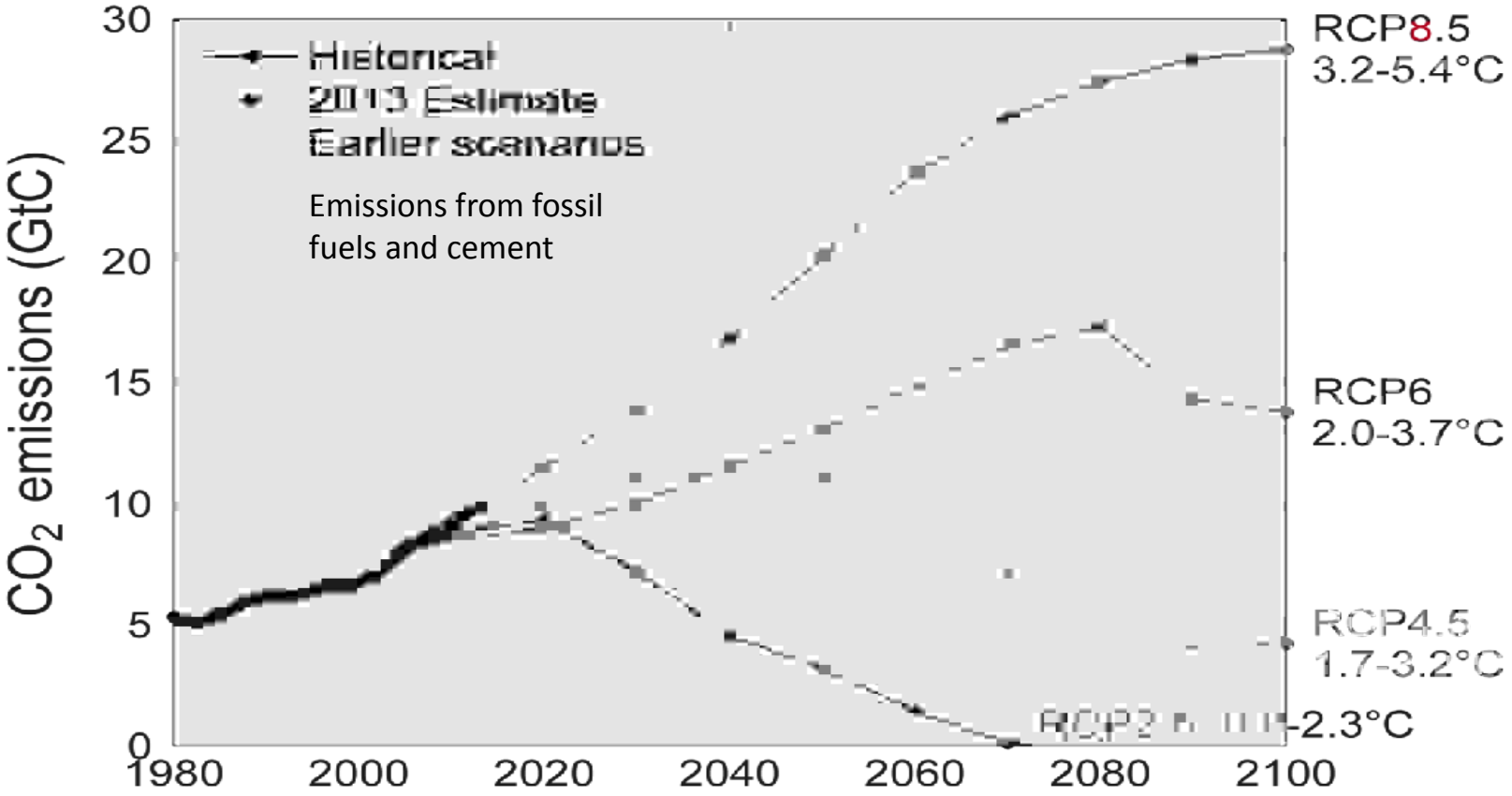
4.3±0.1 GtC/yr
45%

Accumulation in the atmosphere
15 Gt CO2/yr (eq. 4.3 Gt C/yr)

Source: Le Quéré et al 2013; CDIAC Data; Global Carbon Project 2013

Observed Emissions and Emissions Scenarios

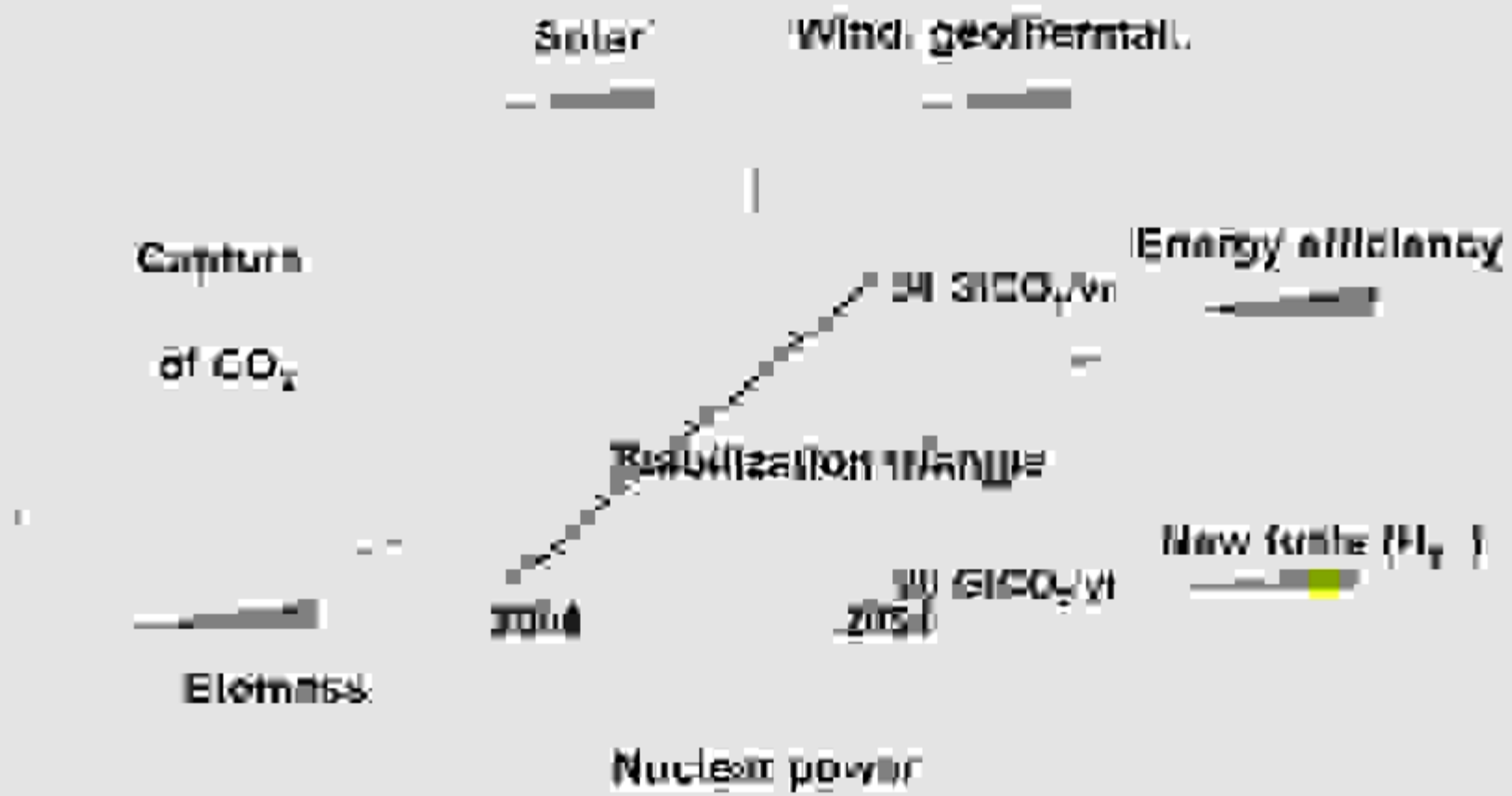
Emissions are on track for 3.2–5.4ºC "likely" increase in temperature above pre-industrial
Large and sustained mitigation is required to keep below 2ºC



Linear interpolation is used between individual data points

Source: Peters et al. 2012a; CDIAC Data; Global Carbon Project 2013

Stabilisation du CO_2 dans un monde en développement en attendant les renouvelables

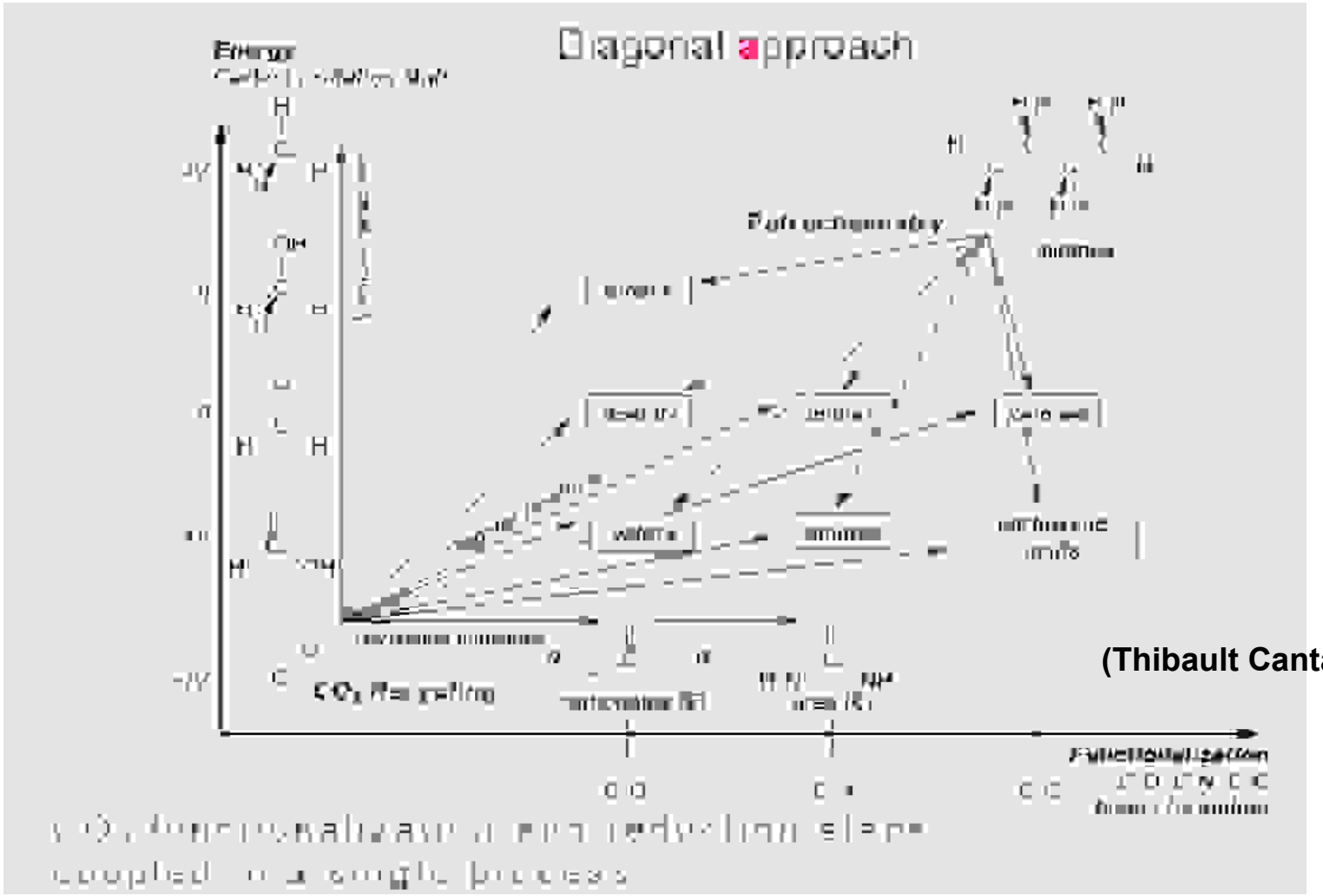


CO_2 capture and storage component costs
1 tCO_2 emitted = 3.15 barrels of crude oil = 300 US$

CCS component	Cost
Capture from a power plant	15 - 75 US$/$tCO_2$ net captured
Capture from gas processing or ammonia production	5 - 55 US$/$tCO_2$ net captured
Capture from other industrial sources	25 - 115 US$/$tCO_2$ net captured
Transportation	1 - 8 US$ per tCO_2 transported per 250km
Geological storage	0.5 - 8 US$/$tCO_2$ injected
Ocean storage	5 - 30 US$/$tCO_2$ injected
Mineral carbonation	50 - 100 US$/$tCO_2$ net mineralized

[redacted]

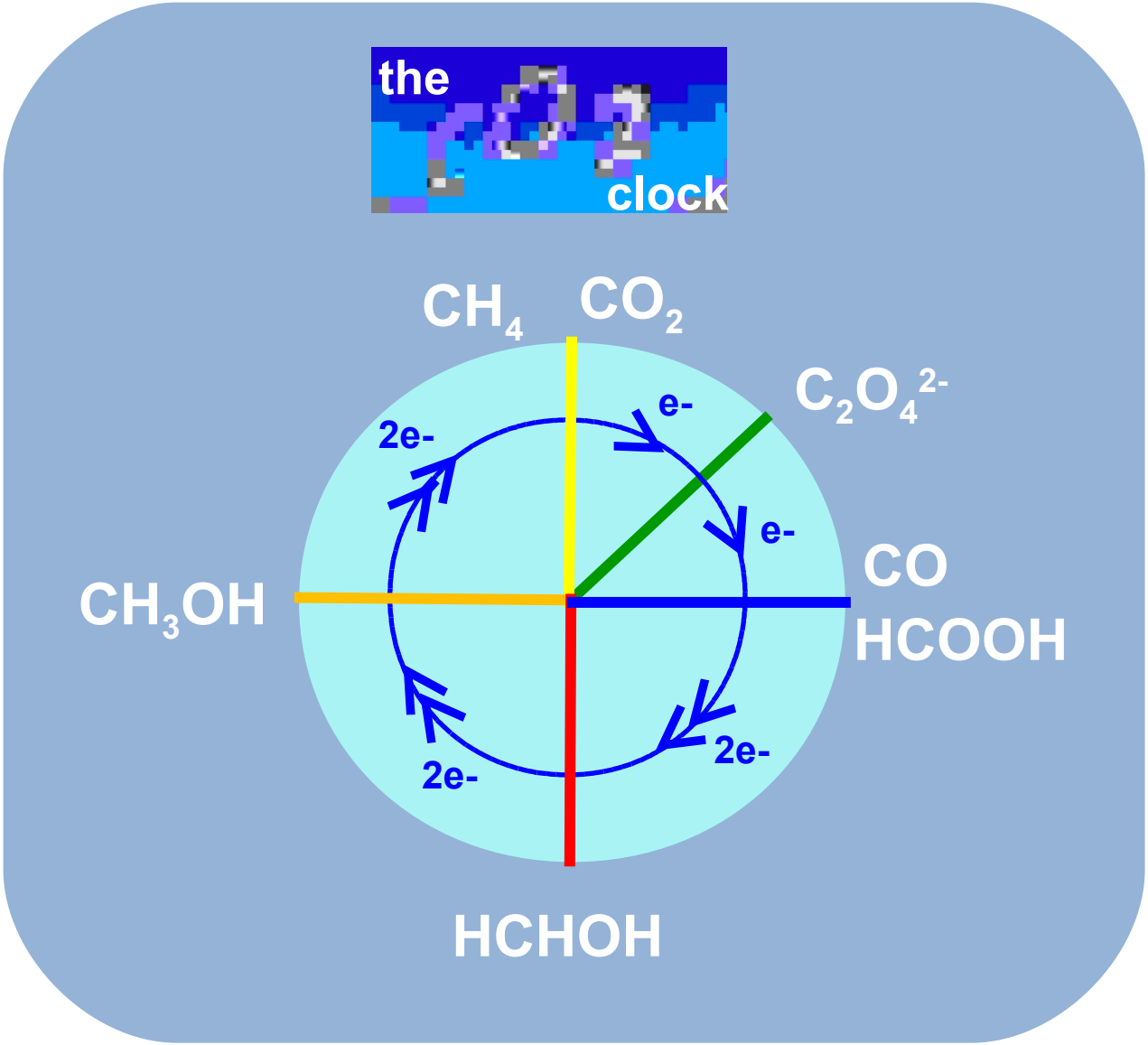
EOR = Enhanced Oil Recovery = [redacted]



(Thibault Cantat, CEA)

Le CO_2 comme matière première : 160 Mt/an aujourd'hui, 3Gt dans 40 ans ?

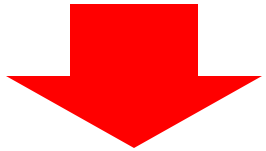
Making fuels and storing intermittent energy from CO_2



Et le 'CO_2 – *made in* – *France*' ?

2014 **400 ppm CO_2 dans l'atmosphère**

2050 **500 ppm CO_2 dans l'atmosphère**



Arrêt complet des activités économiques et humaines sur le sol français

499 ppm CO_2

All the data is shown in GtC

1 Gigatonne (Gt) = 1 billion tonnes = 1×10^{15}g = 1 Petagram (Pg)

1 kg carbon (C) = 3.664 kg carbon dioxide (CO_2)

1 GtC = 3.664 billion tonnes CO_2 = 3.664 $GtCO_2$

La MAC Curve de McKinsey comme exemple de représentation controversée des enjeux