5 DRIVERS TO REDUCE CO_2 EMISSIONS

THE KAYA IDENTITY USED TO DECOMPOSE TRANSPORT EMISSIONS

$$CO_2 = \text{Population} \times \text{Transport demand} \times \text{Modal shift} \times \text{Loading rate of vehicles} \times \text{Energy efficiency of vehicles} \times \text{Carbon intensity of energy}$$
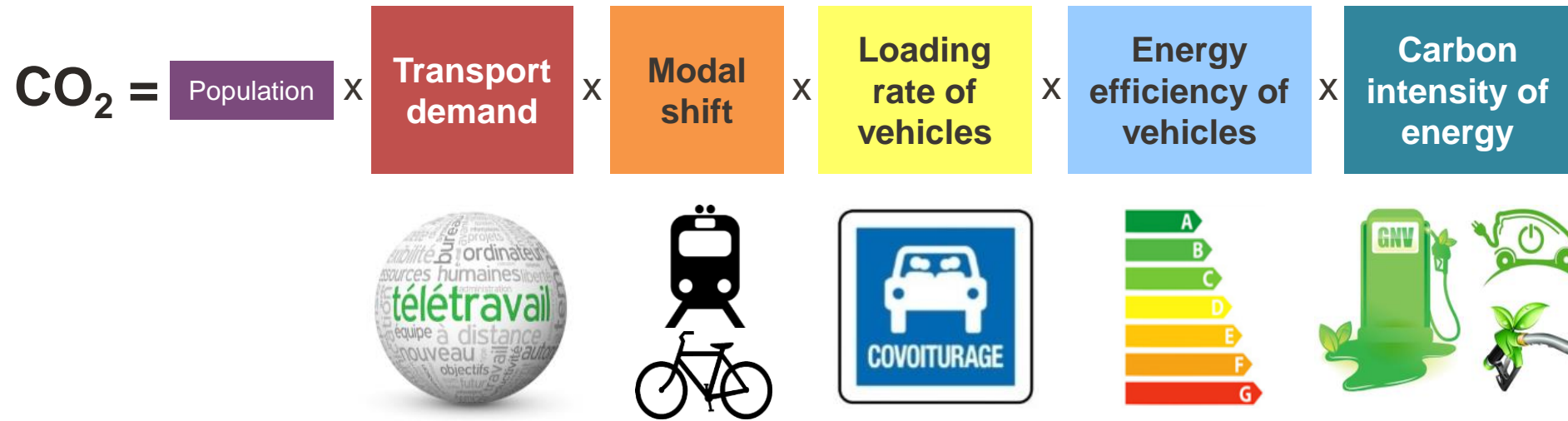
P : French population

D : transport demand for passengers or goods (pass.km or t.km)

D_i : transport demand for the mode i (pass.km or t.km)

C_i : traffic of vehicles of the mode i (veh.km)

E_i : energy consumption by the mode i (Mtep)

$CO_{2,i}$: CO_2 emissions of the mode i (MtCO$_2$)

$$CO_{2,\text{Transport}} \equiv \sum_i P \cdot \frac{D}{P} \cdot \frac{D_i}{D} \cdot \frac{C_i}{D_i} \cdot \frac{E_i}{C_i} \cdot \frac{CO_{2\,i}}{E_i}$$

Aurélien Bigo

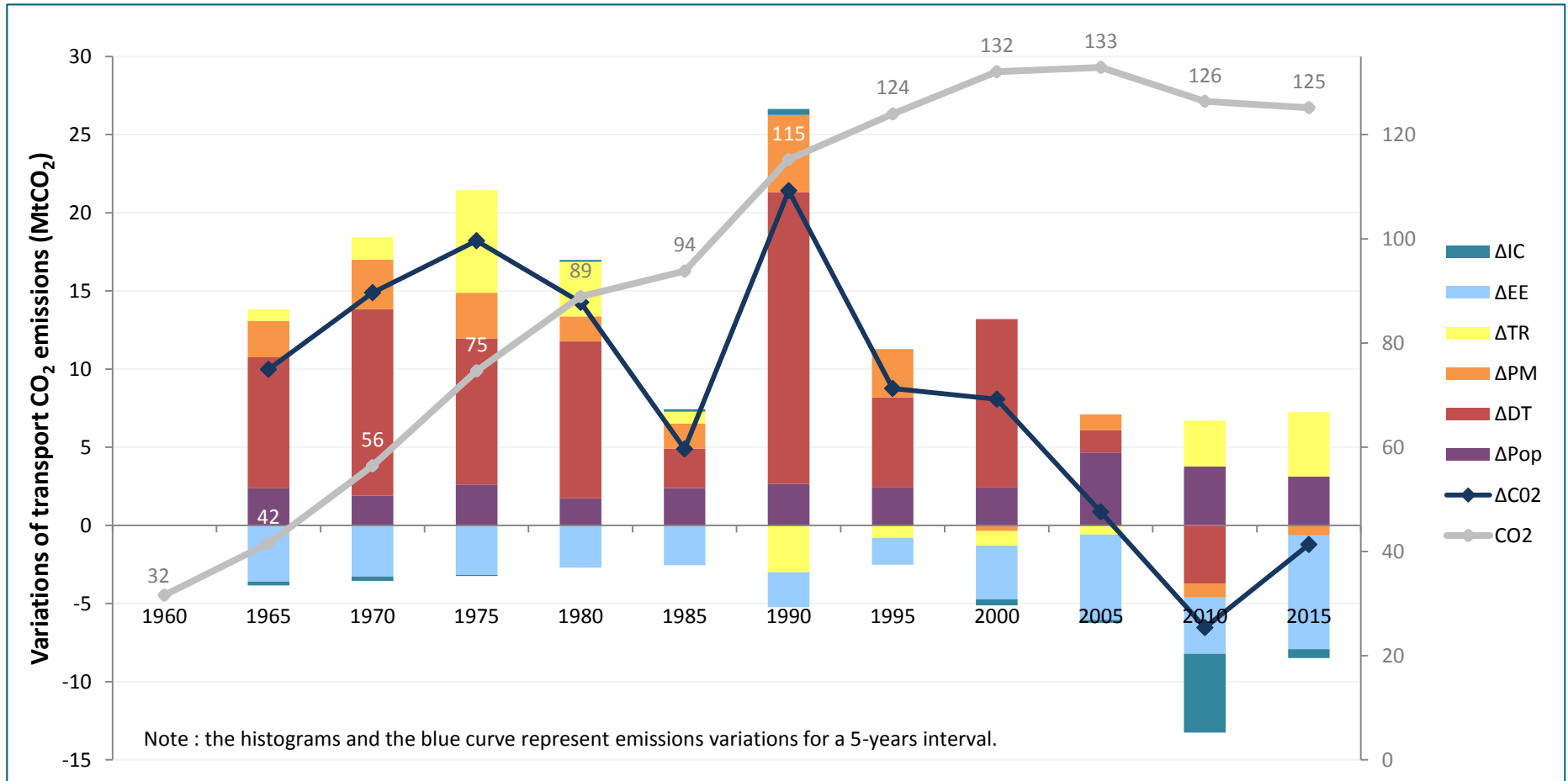PhD thesis on the analysis of energy transition in the transportation sector

EVOLUTION BETWEEN 1960 AND 2015

CO_2 = Population × Transport demand × Modal shift × Loading rate of vehicles × Energy efficiency of vehicles × Carbon intensity of energy

EVOLUTION AND CONTRIBUTING FACTORS OF CO_2 EMISSIONS FROM PASSENGERS AND FREIGHT TRANSPORT IN FRANCE BETWEEN 1960 AND 2015

Note : the histograms and the blue curve represent emissions variations for a 5-years interval.

AURÉLIEN BIGO
WCTRS Conference | 22/06/2018

$$CO_2 = \text{Population} \times \text{Transport demand} \times \text{Modal shift} \times \text{Loading rate of vehicles} \times \text{Energy efficiency of vehicles} \times \text{Carbon intensity of energy}$$

PROSPECTIVE SCENARIOS TO 2050

EXAMPLE OF THE SCENARIO MOBILITY-FIRST OF THE PASSENGERS SCENARIOS FROM IDDRI

MOB-first scenario

Variations of transport CO_2 emissions ($MtCO_2$)

ΔIC
ΔEE
ΔTR
ΔRM
ΔAct
ΔPop
ΔCO2
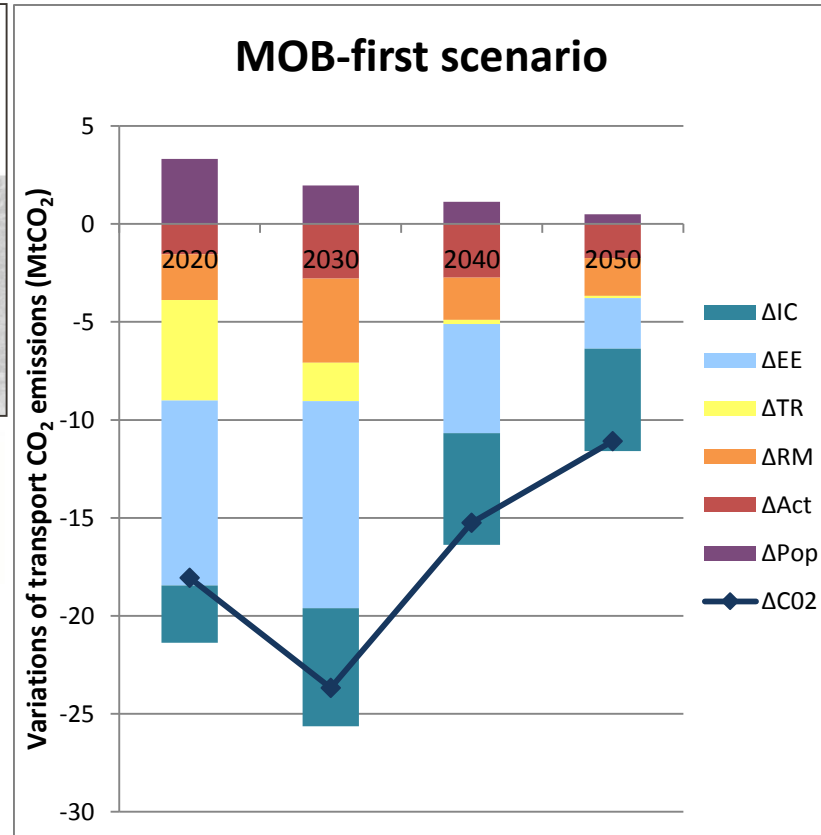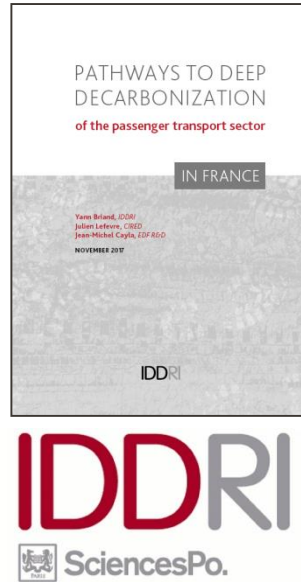
Données : IDDRI, 2017
Pathways to Deep Decarbonization of the passenger transport sector in France