Energy – Climate – Air pollution

Emissions of air pollutants in 2020 and in 2030

Attainability of ambition levels for France

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Content

- ✓ Scenarios produced
- ✓ Emissions of GHG in France in 2020 and 2030
- ✓ Emissions of air pollutants in France in 2020 and 2030
- ✓ Comparison with ambition levels
- ✓ Conclusions

Study carried out by CITEPA for the French Ministry of Ecology - March 2011

(N. ALLEMAND, J. JABOT, E. DEFLORENNE, C. GUEGUEN, E. PROUTEAU , J-M. ANDRE, J-P. CHANG, R. JOYA, E. MATHIAS, J-P. FONTELLE)

OPTINEC 4 – Scénarii prospectifs climat – air – énergie. Evolution des émissions de polluants en France à l'horizon 2020 et 2030

Scenarios produced

- ✓ **AME (WEM)** Existing PAMs adopted < 2010
- ✓ **AMSM** Existing PAMs < 2010 + effects expected from additional PAMs taken after the 01/01/2010
- ✓ **AMSO (WAM)** Existing PAMs < 2010 + full compliance with the target as a result of supplementary Policies (Full compliance with the EU energy package and Grenelle of environment objectives)

Economic crisis taken into account.

PAMs : policy and measures. Set of measures to reduced GHG linked to energy saving, energy efficiency, EU ETS, renewable energy, biofuels in transports, changes in the characteristics of the freight transport (less road transport)....

GHG estimated for those three scenarios, but also other ones

AME, AMSM and AMSO scenarios studied for atmospheric pollutants

Regulations taken into account for atmospheric pollutants

Two cases :

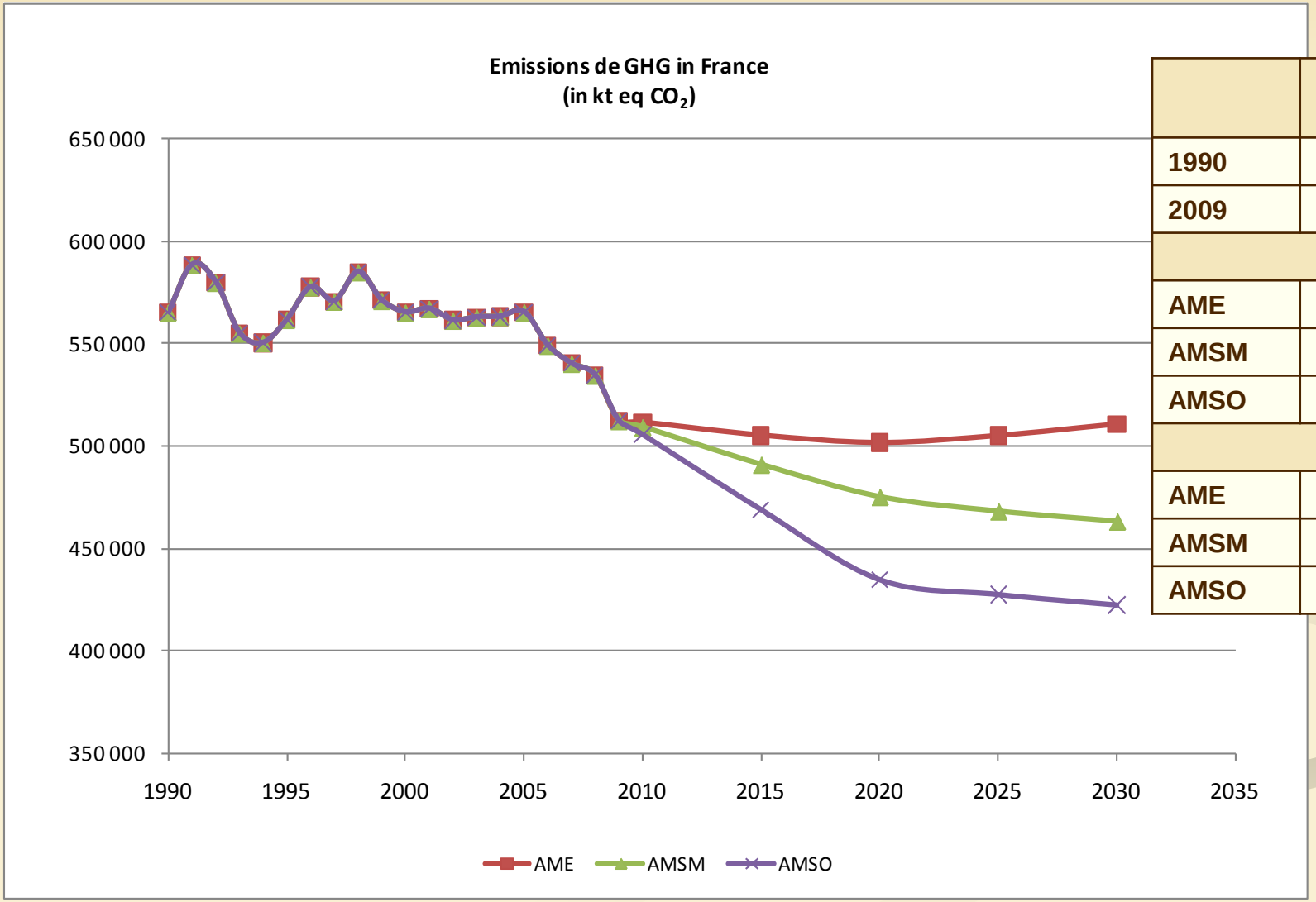
Common legislation (LC):

- ✓ National regulation not linked to EU directives
- ✓ IPPC directive
- ✓ Directives on the sulphur content of liquid fuels
- ✓ Euro standards for light duty vehicles and heavy duty vehicles, two wheels
- ✓ Legislation on non road mobile sources
- ✓ ...

With additional measures for air pollutants (MAPA):

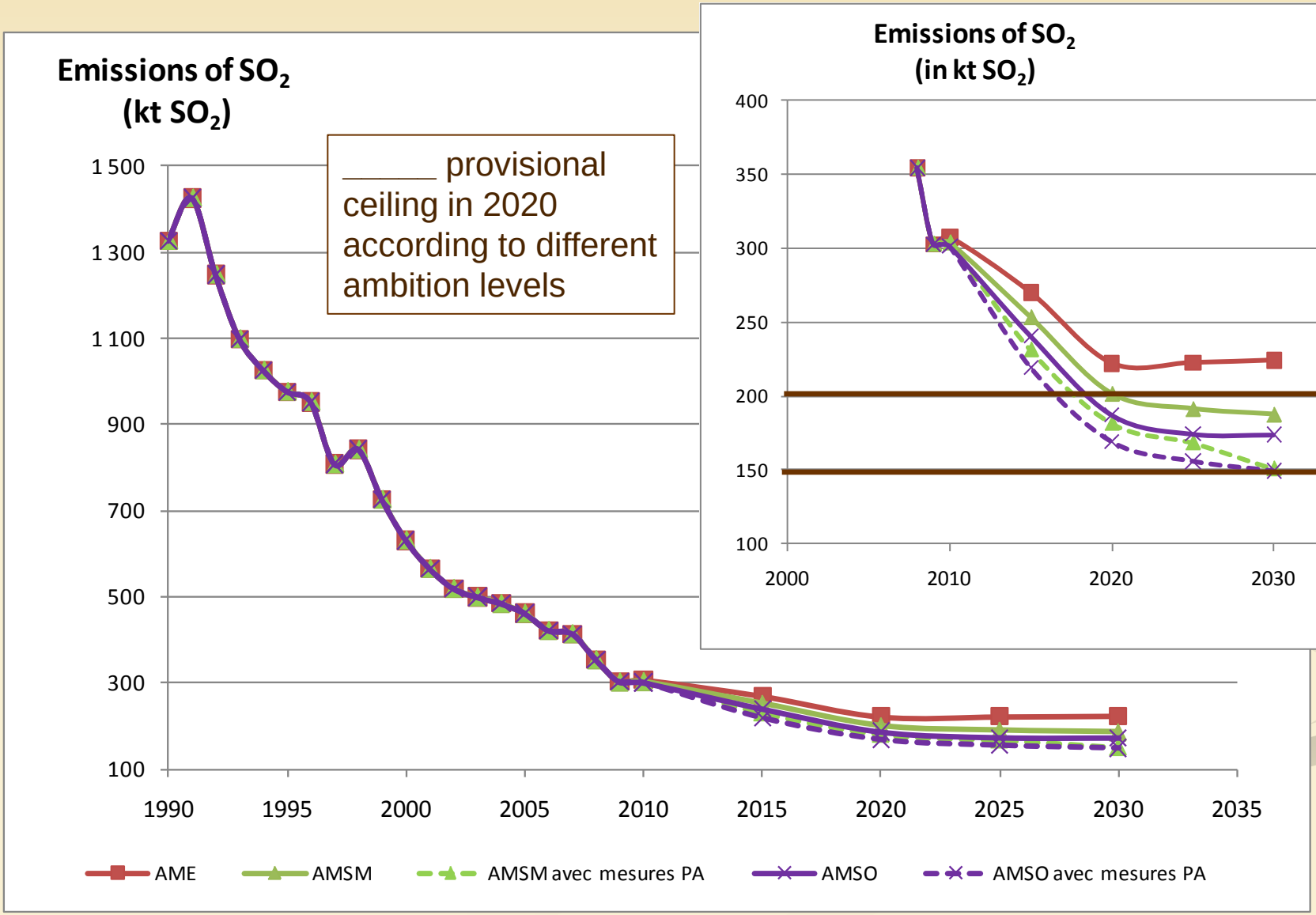
- ✓ IED directive
- ✓ Stricter ELVs than the existing regulation for combustion plants lower than 50 MW
- ✓ Faster replacement of heating domestic appliances using light distillate fuel or natural gas with the most efficient and less emitting techniques (condensation boilers)

GHG emissions (LULUCF excluded) (Mainland France + Overseas territories)

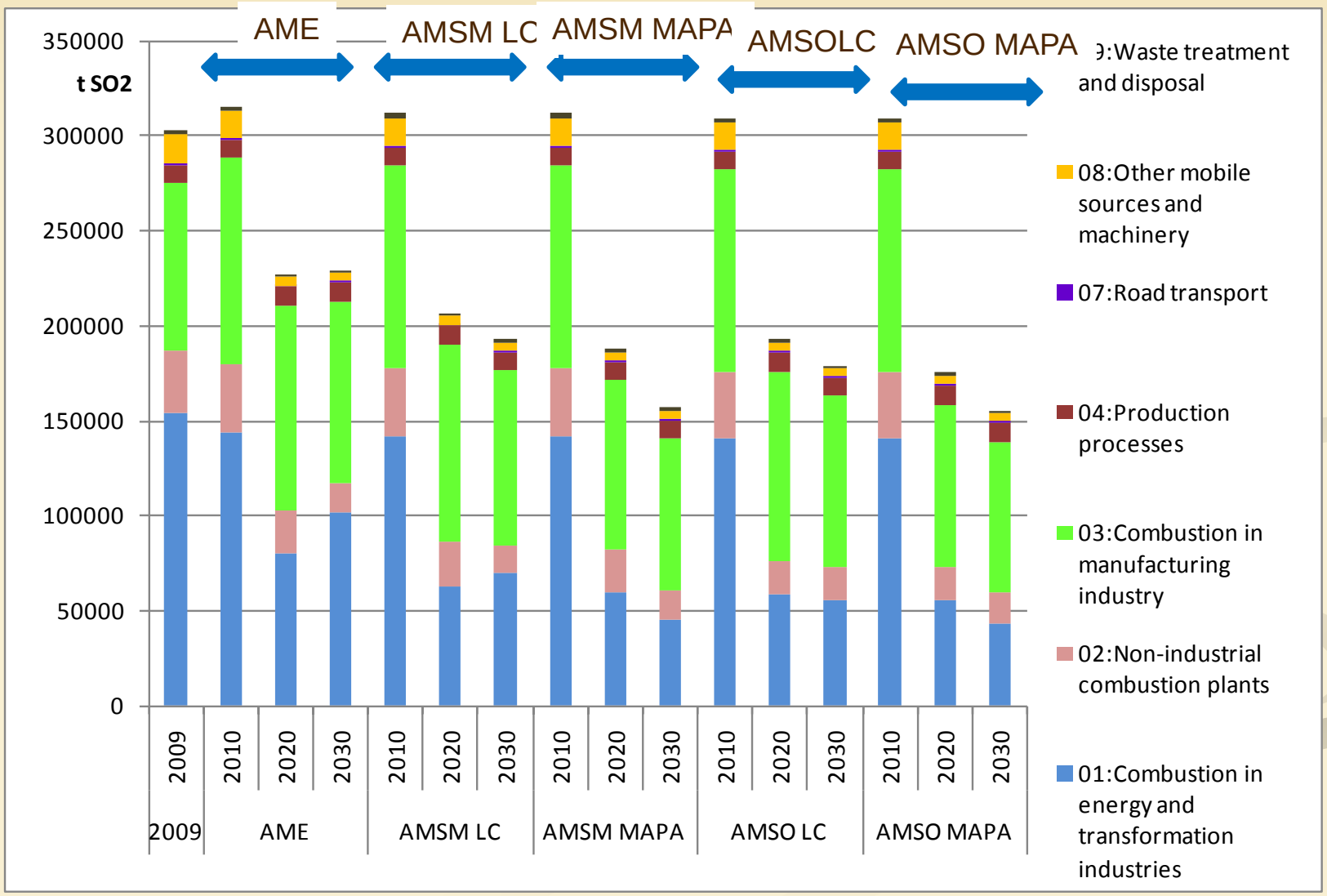


	MT éq CO_2	
1990	565,3	
2009	514,7	
2020		
AME	501,6	-11%
AMSM	475,1	-16%
AMSO	434,6	-23%
2030		
AME	510,6	-10%
AMSM	463,1	-18%
AMSO	422,3	-25%

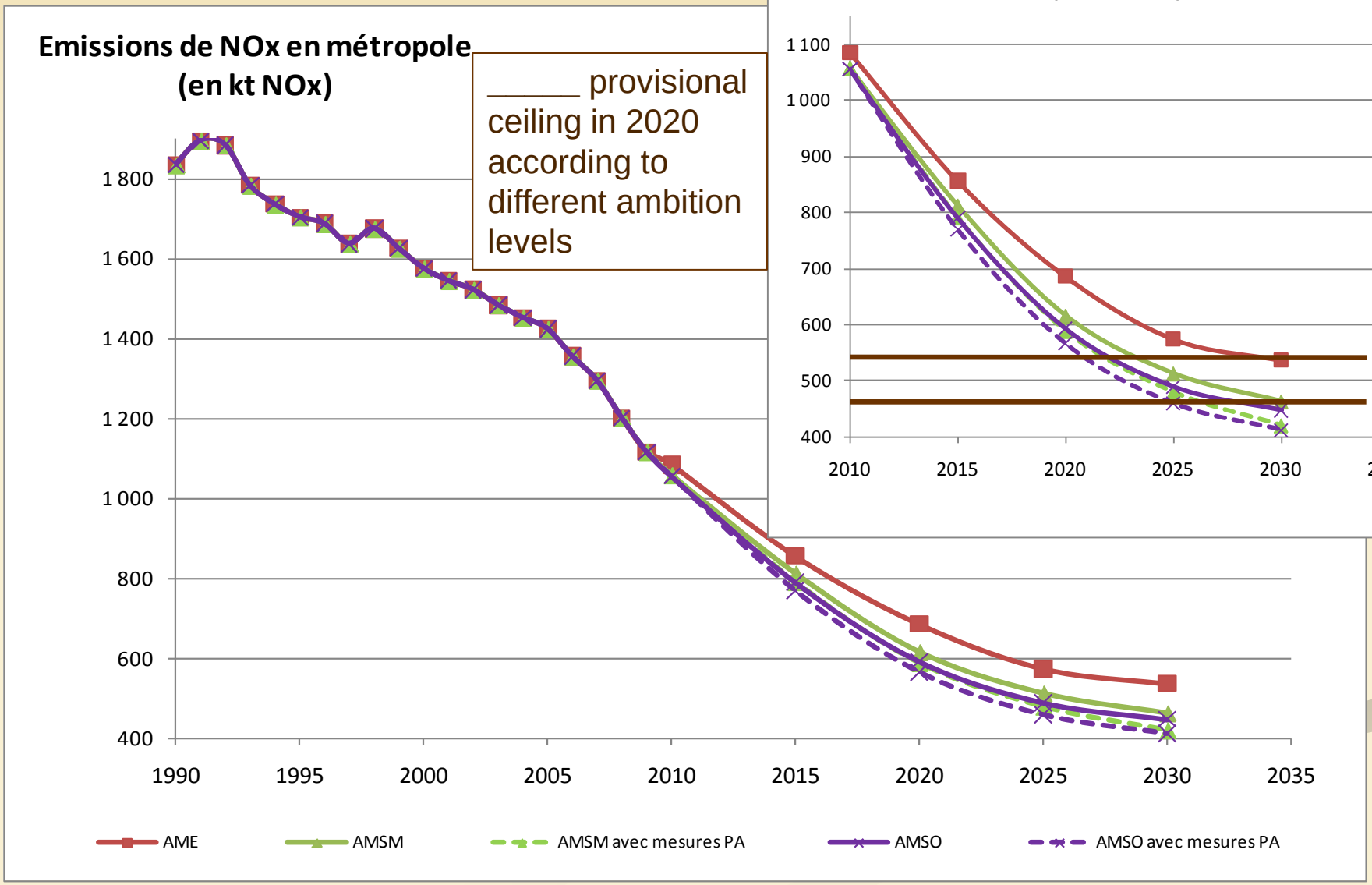
SO_2 emissions



SO_2 emissions by sectors



NOx emissions – Mainland France



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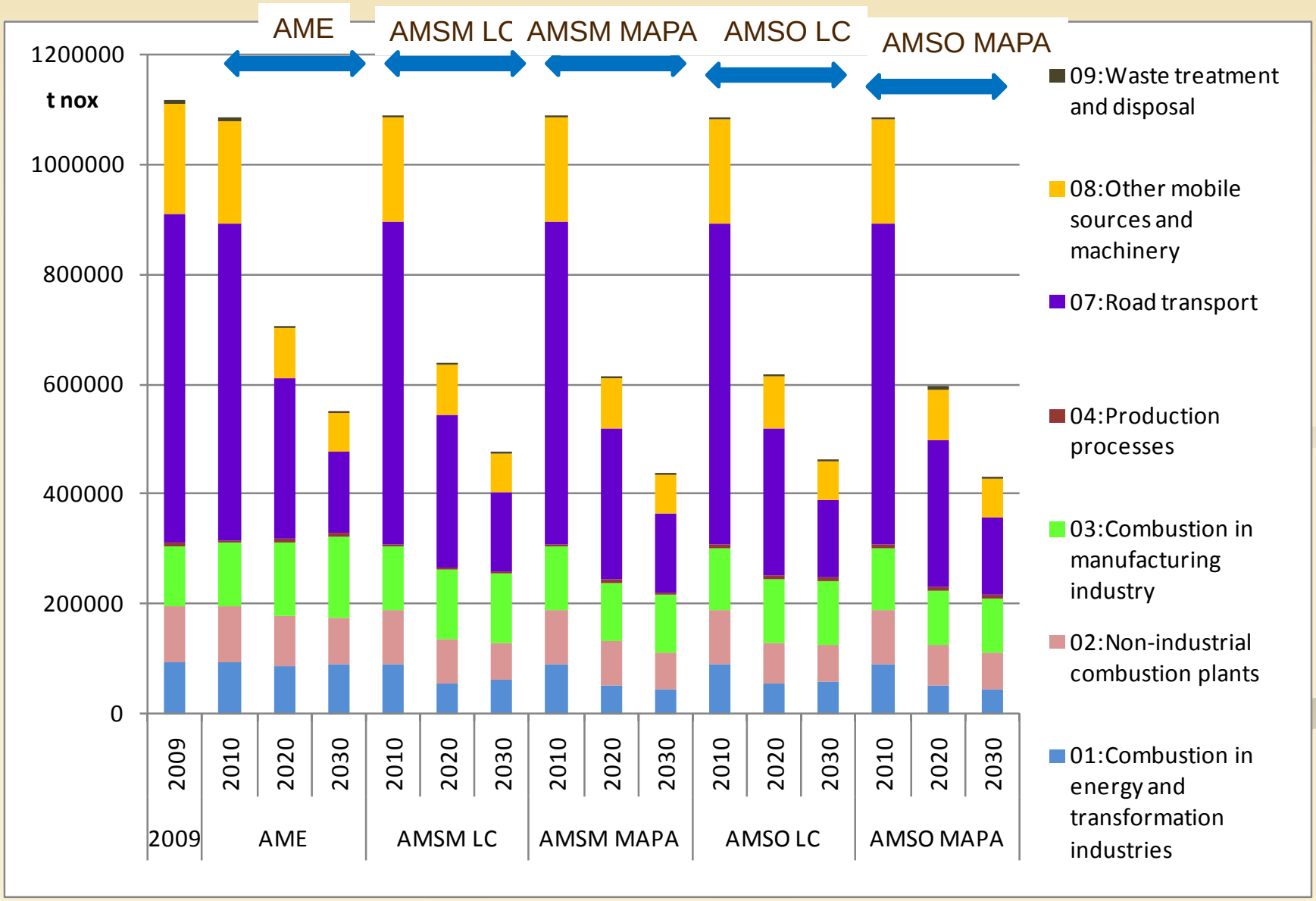
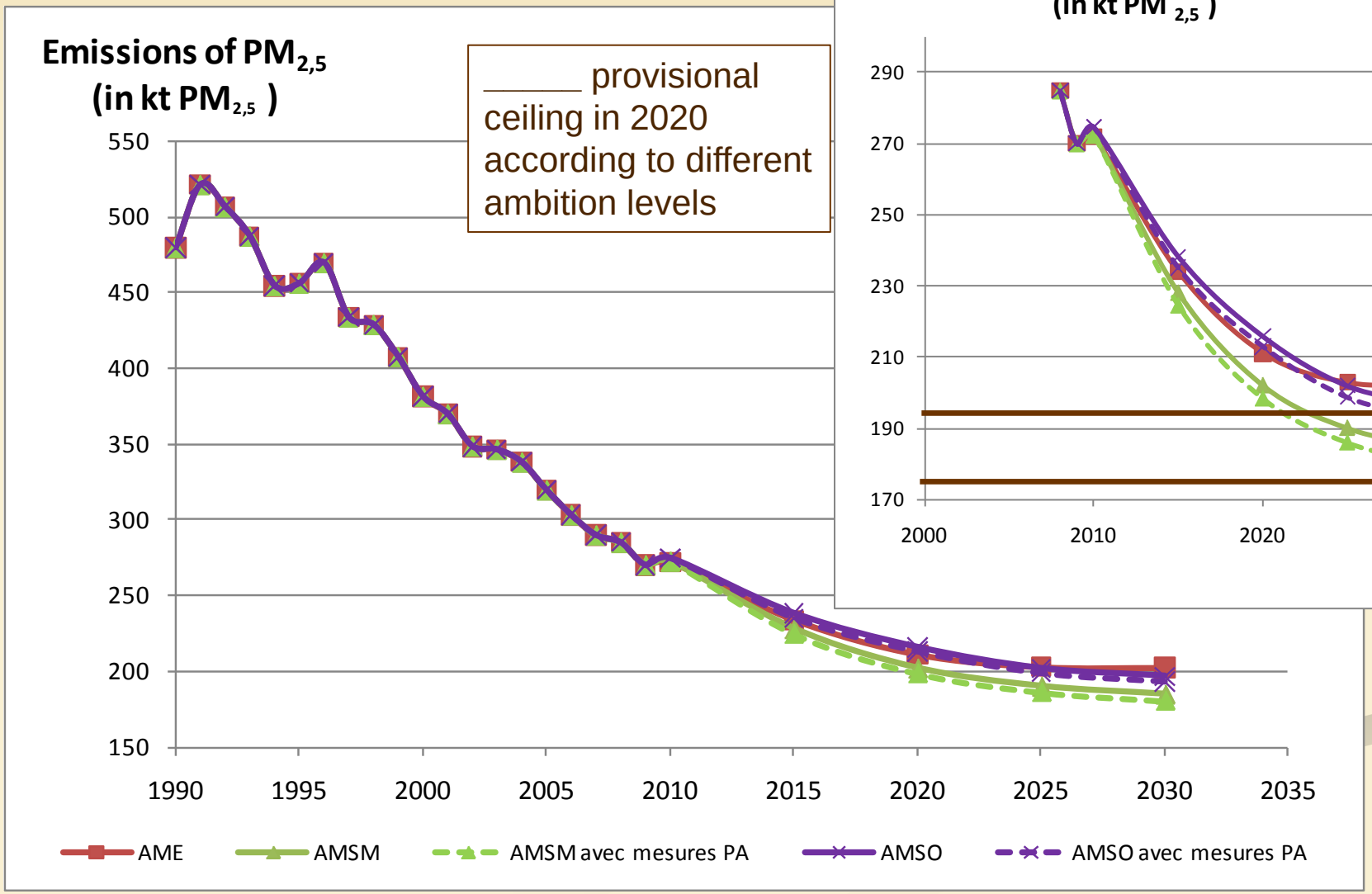


PM $_{2.5}$ emissions – Mainland France



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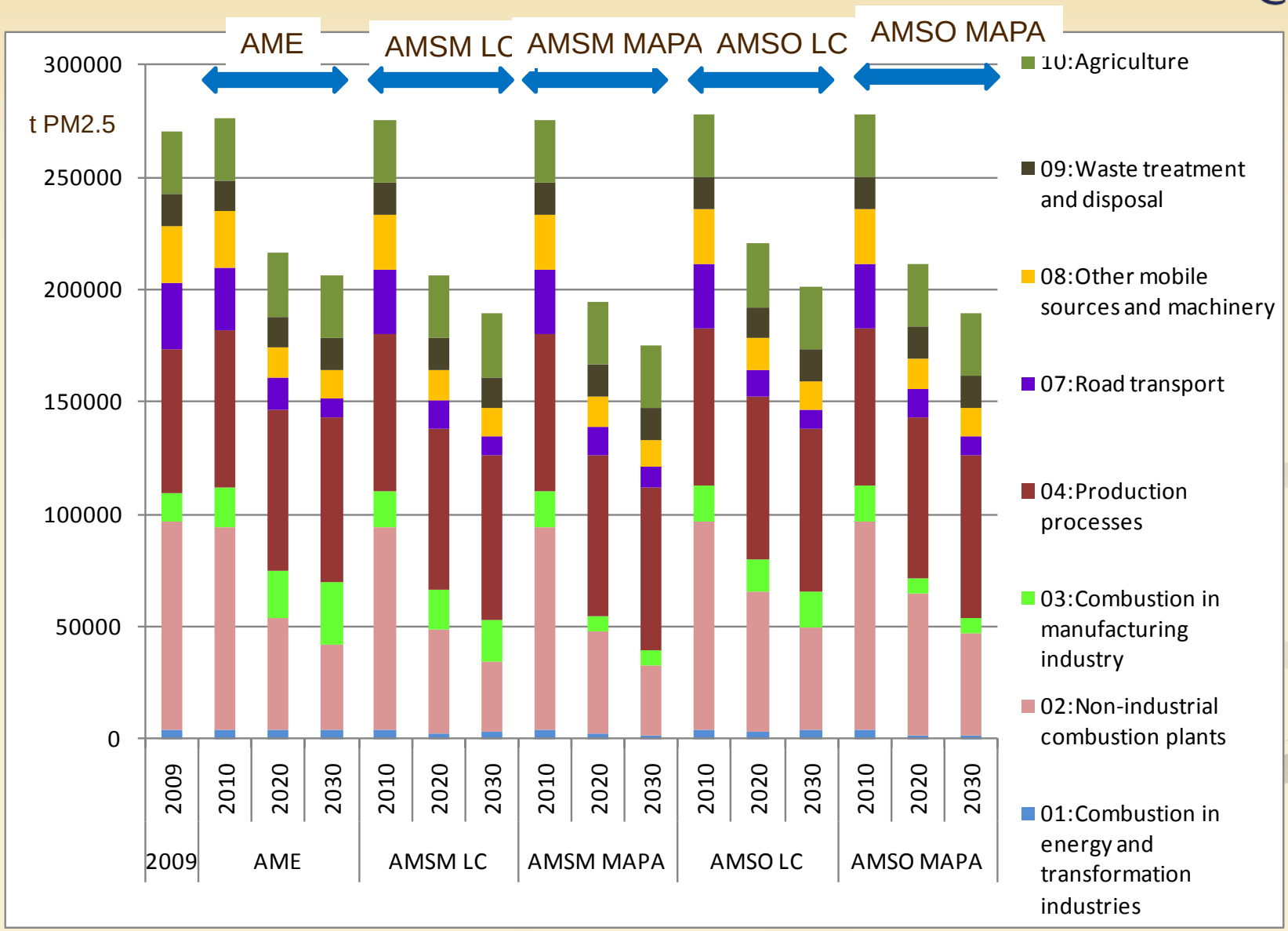

Attainability of ambition levels

- ✓ **Energy savings and other measures** needed to meet the EU Climate/Energy targets and the French national targets **enable emission reductions** linked to the production and use of energy (SO_2, NOx, a part of $PM_{2.5}$ and NMVOCs),

- ✓ The most ambitious scenario to reduce GHG, AMSO, with MAPA **does not enable** to reach all the targets and presents more NOx , $PM_{2.5}$ and NMVOC emissions than a less ambitious scenario (AMSM MAPA)

Difference in emissions /amb. level	SO_2		NOx		NMVOC		PM2.5		NH_3	
	AMSM MAPA	AMSO MAPA	AMSM MAPA	AMSO MAPA	AMSM MAPA	AMSO MAPA	AMSM MAPA	AMSO MAPA	LOW	HIGH
BL	-6%	-12%	6%	5%	-22%	-18%	-6%	2%	-24%	-49%
LOW	-4%	-10%	13%	11%	-21%	-16%	0%	8%	-15%	-43%
Low*	-5%	-11%	12%	11%	-21%	-16%	-1%	8%	-2%	-34%
MID	-3%	-9%	17%	15%	-19%	-15%	2%	11%	3%	-31%
Hihg *	27%	18%	21%	19%	-17%	-12%	11%	20%	12%	-25%
HIGH	26%	18%	28%	26%	-11%	-6%	11%	20%	19%	-21%
MTFR	42%	33%	29%	27%	17%	23%	82%	97%	32%	-12%

In red : ceiling not reached, difference > 15 % ; in orange ceiling not reached but difference less than 15 %, in green ceiling reached

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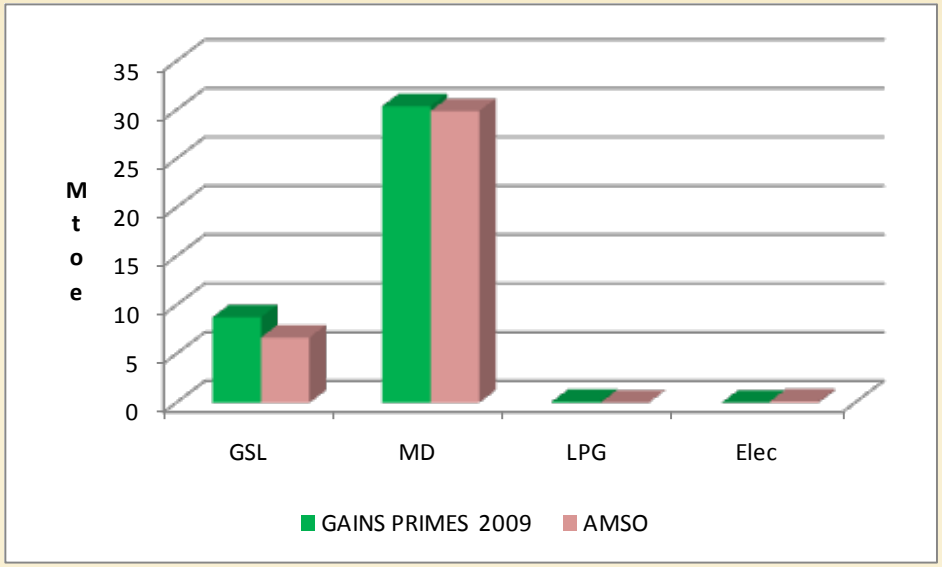
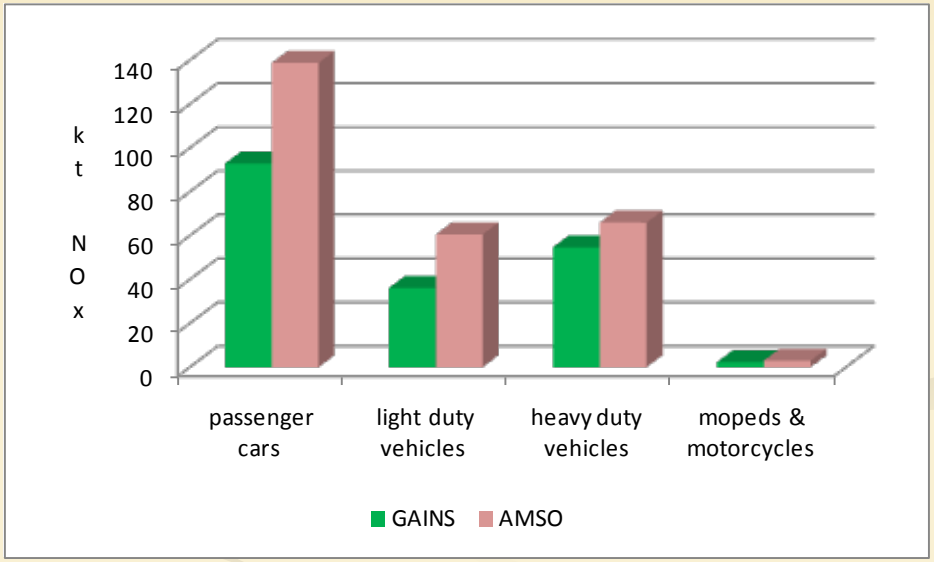
Some comparisons of results from PRIMES 2009/GAINS and AMSM /AMSO

Total consumption of fuel of road traffic



Emissions of NOx of road traffic per type of vehicles



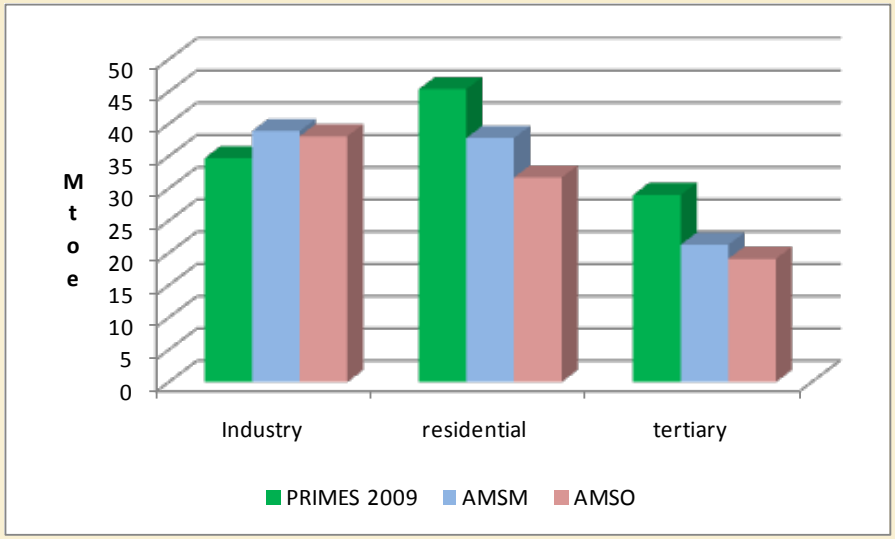
High differences in NOx emissions (+82 kt for AMSO compared to the BL) due to :

✓ Different dates of implementation of Euro standards (GAINS assumes anticipation of the compliance of new vehicles, CITEPA considers the effective date of application of the standards for all the production)

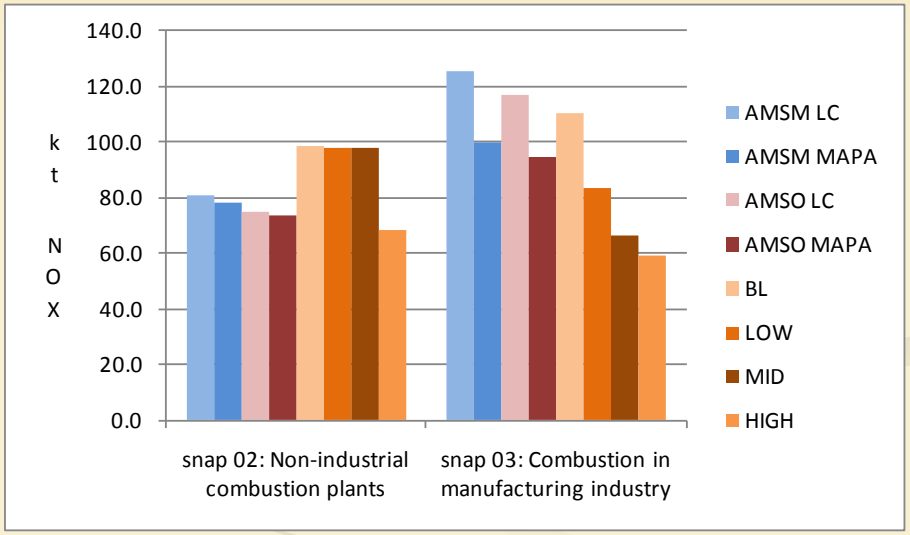
✓ Turnover of vehicles different (less rapid turn over considered by CITEPA than in GAINS)

Some comparisons of results from PRIMES 2009/GAINS and AMSM /AMSO

Total consumption of energy per sector
Industry, residential, tertiary in 2020
According to PRIMES 2009 and AMSO



Emissions of NOX in industry according to scenarios



In Industry, apparent relative consistency.
However overestimation in GAINS of the penetration of SNCR and SCR, too optimistic compared to the IED requirement and the French regulation for combustion installation lower than 50 MWth (as example SNCR used on 93 % of the natural gas consumption in "IN BOILER" in 2010; In France, there is no reference of SNCR on a combustion plant using natural gas)
High rates of penetration of PRNOX2 or 3 reduction techniques in processes which can hardly be explained

Conclusions

- ✓ Estimations of pollutant emissions in 2020 based on **ambitious scenarios for reducing GHG (high level of energy savings as example, ...) and additional measures for pollutants which are in preparation (small combustion installation as example) by the French Ministry of Ecology**
- ✓ **Work on a very detail level of activities (SNAP level 3) and plant per plant for LCP**
- ✓ **NOx : major problem, no ambition level is reached in 2020**, even with new measures for certain activities
- ✓ **$PM_{2.5}$: the lowest ambition level can be reached in some circumstances** but not with the most ambitious scenario for reducing GHG (impact of biomass combustion)
- ✓ The **MID ambition level could be reached for SO_2**
- ✓ **NH_3 :** emission reduction needs the effective implementation of measures identified. These measures are not yet implemented totally. **The lowest ambition level probably difficult to reach**
- ✓ **NMVOC : all ambition levels reached**

Conclusions

✓ **Emissions of NOx, $PM_{2,5}$ and NMVOCs can be significantly impacted by the increase in use of biomass which is included in climate PAMs**.

Therefore, **the best scenario regarding GHG emission reductions is not the best for all air pollutant emission reductions** (eg. $PM_{2.5}$ and NMVOCs)

✓Analysis of differences between GAINS results and the French study results to be continued but some differences already highlighted which could be solved (especially for road traffic). Is this possible?

Thanks for your attention

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The reference for the atmosphere of the future