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Environmental Science for European Refining

Higher renewable blends in gasoline: Challenges and opportunities

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Roland Dauphin, Science executive Fuels Quality and Emissions

RED II / RED III / RePowerEU: Opportunities and challenges

- **Neither E10 nor 'E20' allows to meet the RED II / RED III / RePowerEU requirements in the gasoline pool**

	E10	'E20'	RED II	RED III / RePower EU	Cap Food & Feed crops ('1G') biofuels	Advanced biofuels mandate
% volume	10%	20%				
% energy	6.6%	13.3%	> 14%		< 7%	> 2.2%
% GHG reduction	~4.5%	~9%		> 13% / 16%		

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Panel of solutions considered

	Solutions	Effects	Constraints
1	More FAME in 'EN590' (e.g. B10) & EtOH in 'EN228' (e.g. E20)	Increase biofuels incorporation rate	- Existing fleet's compliance - F&F cap + FQD revision (for EN228) - Does not meet renewable targets
2	More E85 and B100 in the mix	Leverage effect	- Develop fleets - Develop infrastructures - F&F cap
3	Replace F&F by advanced biofuels	- CO_2 abatement	- Constraints in EN228 and EN590 for oxygenated compounds - Cost - Does not meet renewable targets
4	Drop-in biofuels	Unlimited incorporation	Cost
5	Renewable electricity	X2 benefit	- Develop fleets - Develop infrastructures

Less expensive biofuels but slow (15-20 years)

Expensive biofuels but immediate effect

Map of know types of biofuels

	F&F (1G)		Advanced	
Non drop-in (oxygenated compounds limited by EN228 and EN590)	**Gasoline** Ethanol Methanol ETBE Isobutanol…	**Diesel** FAME	**Gasoline** Ethanol	**Diesel**
Drop-in	**Gasoline** Bionaphtha	**Diesel** HVO **Gas** Biomethane	**Gasoline** MtG EtG	**Diesel** BtL **Gas** Biomethane

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Should ‘E10+’ have a minimum ethanol content?

- **Ongoing discussions on a Technical Specification (TS) for E10+ at CEN level**
  - *Discussions stalled regarding the minimum oxygen / oxygenate / ethanol content*
  - *Some stakeholders are in favour of a minimum ethanol content (10% v/v or 15% v/v)*
    - **Resulting in a narrow E10+ specification (10-20% v/v ethanol or 15-20% v/v ethanol)**
  - *Other stakeholders stand against the principle of a minimum oxygen / oxygenate / ethanol content*
    - **Resulting in a broader E10+ specification (0-20% v/v ethanol)**
- **Pros of a minimum ethanol content**
  - *« Kind of guarantees » a minimum renewable content in the fuel to the end customer and to the authorities (note that it is out of the CEN scope)*
  - *A narrower fuel specification can result in more optimized engine calibration for the OEMs (and is generally easier to manage from the ECU perspective)*
- **Cons of a minimum ethanol content**
  - *Fuel retailers may refuse to roll out E10+ because of threats on the supply chain (note that it is out of the CEN scope)*
    - **E.g. 15% v/v ethanol corresponds to 10% energy, well above the 7% cap on food and feed crops biofuels**
    - **What happens if you have not secured the supply advanced ethanol?**
  - *A narrower fuel specification for optimized engine calibration purpose does not make any sense as long as the concerned vehicles are also allowed to refuel with E5 and E10.*

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Thank you for your attention

Roland Dauphin
roland.dauphin@concawe.eu