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Estimating Emissions from Mobile Machinery in Croatia

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Overview

Generally

- **Scope of Mobile Machinery**

NFR	SNAP	Category name
1.A.2.f.ii	0808	Manufacturing Industries and Construction
1.A.4.a.ii	0810	Commercial and Institutional; Other
1.A.4.b.ii	0809	Residential (Household and Gardening)
1.A.4.c.ii	0806 0807	Agriculture Forestry
1.A.4.c.iii	0804	Inland waterways
1.A.5.b	0801	Military



Overview

In Croatia

- Emissions are presented in

NFR	SNAP	Category name
1.A.2.f ii	0808	Industry
1.A.4.b ii	0809	Residential
1.A.4.c.ii	0806, 0807	Agriculture, forestry

- Use of notation key IE

NFR	SNAP	Included in NFR (name)
1.A.4.a.ii	0809	1.A.4.b.ii, (residential) 1.A.4.c.ii (agriculture, forestry)
1.A.4.c.iii	0804	1 A 3 d ii (national navigation)
1.A.5.b	0801	1.A.3.a, 1.A.3.b, 1.A.3.d (civil aviation, road transport, navigation)



Significance

- **Mobile machinery – key source?**

NFR	SNAP	Name	Key source in 2012	Pollutant	Share in national total
1.A.2.f ii	0808	Industry	yes	NOx	7.7 %
1.A.4.b ii	0809	Residential	no	-	
1.A.4.c.ii	0806 0807	Agriculture, Forestry	yes	NOx PM _{2.5} Cu	14.7 % 2.9 % 4.1 %



Methodology

- **Activity data**
 - Fuel consumption for different NFR categories and each fuel type from National energy balance (based on fuel sold) – *available*
 - Detail data at an equipment level – *not available*
 - Country specific studies – *not available*



Methodology

- Choice of method – decision tree for Mobile Machinery
- Tier 1 default approach

$$E_{pollutant} = \sum_{fuel\ type} FC_{fuel\ type} \times EF_{pollutant\ fuel\ type}$$

- $E_{pollutant}$ = emission of specified pollutant
- FC = fuel consumption for each fuel for the source category
- $EF_{pollutant}$ = EF for pollutant for each fuel type



Methodology

- **Emission factors**

- EMEP/CORINAIR Tier 1 emission factors by fuel type and NFR sectors:
 - 1.A.4.c.ii – Agriculture and forestry
 - 1.A.2.f.ii – Industry
 - 1.A.4.b.ii – Residential
- Differences exist between currently used and Tier 1 EMEP/EEA EFs
- EFs for PM, TSP, HMs and POPs are harmonized with default EMEP/EEA tier 1 EFs
- EFs for SO₂ are change yearly according to S content in fuels



Challenges

Improve methodology for emission estimation from Mobile Machinery by taking:

- **small steps:**
 - Improve currently used EFs and harmonize them with default Tier 1 EFs from EMEP/EEA guidebook
 - Include estimates for pollutants which missing (eg. black carbon)
 - Can be carried out at the annual preparation of the inventory



Challenges

Improve methodology for emission estimation from Mobile Machinery by taking:

- **big steps:**
 - Apply Tier 2 methodology
 - Collect activity data on an equipment level or
 - Make efforts and try to split the total fuel consumption into engine technology layers for each inventory year (alternative way proposed in EMEP/EEA guidebook)
 - Can't be carried out at the cycle of annual inventory preparation
 - Need extra time and financial resources



Conclusions

- **Mobile machinery is key category in Croatia**
- **EFs harmonization need to be apply for all pollutants**
- **Tier 2 method need to be apply**
- **Improving methodology required extra time and additional funding**



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