

COPERT Training

7. Energy Balance

Automated energy balance (1/3)

- In COPERT 4 by providing statistical fuel consumption and performing a fuel balance CO₂ and fuel consumption dependant emissions were corrected accordingly
- COPERT 5 compares statistical and calculated energy consumption, modifies a number of input data (eg mileage, blend share) and recalculates emissions

Automated energy balance (2/3)

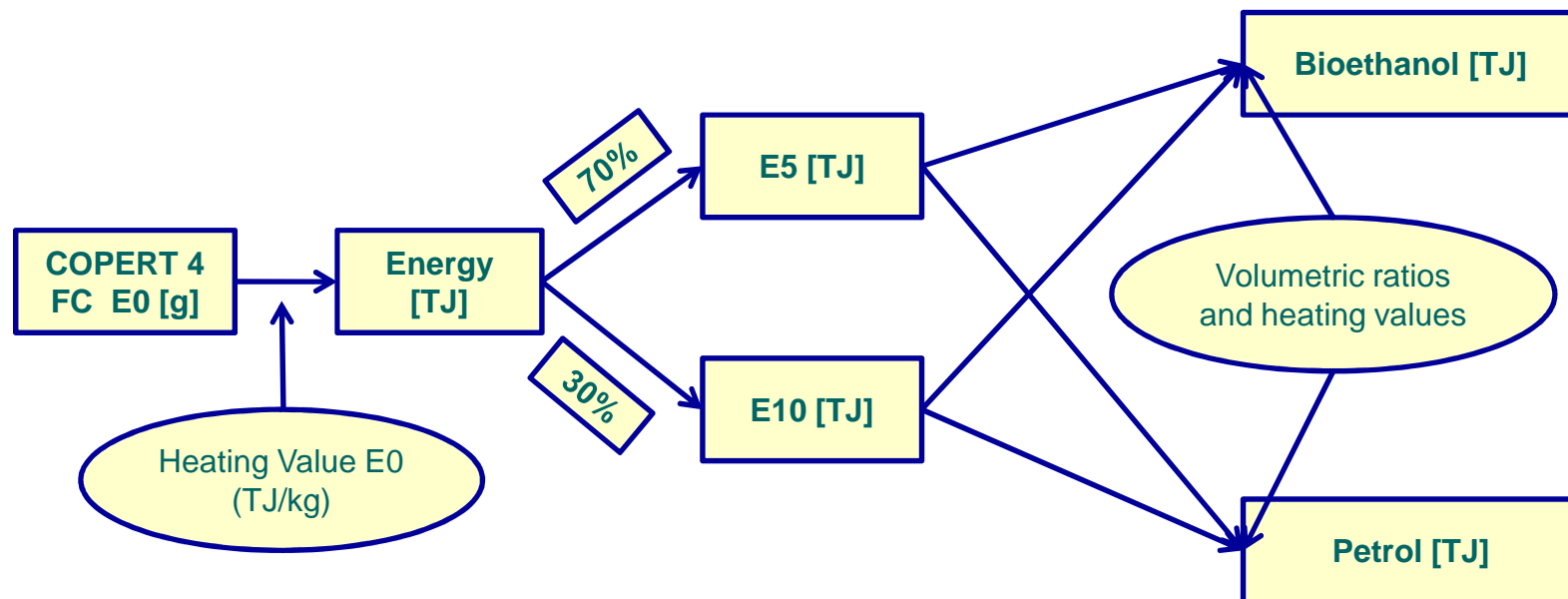
- Assumptions

- Fuel consumption calculated with COPERT 4 functions comes from 100% fossil fuel
- Vehicle **efficiency does not** depend on fuel blend used (i.e. specific energy consumption independent of fuel blend)
- Fossil / Renewable statistical **ratio** per fuel type will also hold for the calculated consumption

Automated energy balance (3/3)

- Adjustments
 1. Blends energy share (e.g. 70/30 -> 72/28)
 2. Blending ratio (e.g. E5 -> E4.5)
 3. Mileage adjusted so that calculated energy per fuel type matches statistical energy per fuel type
- Finally:
 - Energy and pollutant emission based on the new mileage (and blends)

Energy allocation: From end to primary fuels



COPERT 4 original fuel consumption functions [g/km] converted to [GJ/km] by user specific heating values [TJ/kg]

Algorithm for adjustments of bio/fossil

- Ratio of sold (biofuel/fossil) fuel energy has to be respected by calculated consumption
- Algorithm steps:
 1. The blend energy share reported by the user first modified if not enough
 2. The blending ratio modified until solution is found

Last step of energy balance

Once bio/fossil ratio adjusted, mileage is adjusted to match total energy consumption:

$$MCF_i = \frac{Energy_sold_i}{Energy_calculated_i}$$

$$NewMileage_j = MCF_i \cdot Mileage_j$$

where

i is either petrol or diesel

j individual vehicle type

Related forms in COPERT 5 (1/4)

The screenshot shows the 'Statistical Fuel Consumption' dialog box. It features a table with two columns: 'Primary Fuel' and 'Total Fuel sales [Tj]'. The table lists various fuel types, each with a value of 0. A red box highlights the table area. Below the table, there is a checkbox labeled 'Apply statistical fuel correction', which is also highlighted with a red box. The dialog includes standard window controls (Undo, Redo, Import, Export) and buttons for 'OK', 'Apply', and 'Cancel'.

Primary Fuel	Total Fuel sales [Tj]
Petrol Grade	0
Petrol Grade	0
Diesel Grade	0
Diesel Grade	0
LPG Grade 1	0
LPG Grade 2	0
CNG	0
Biodiesel	0
Bioethanol	0
H2	0
Electricity	0

Related forms in COPERT 5 (2/4)

Status

File

Country : **Italy**
Run Mode : **Timeseries**
Created : **13 Oct 2016, 20:48**
Saved : **Never**

Year : 2014

Fuel Balance : **YES**
Improved Fuel Quality Year : **1996**
Mileage Degradation : **No Effect**
Lube-Oil CO2 Effect : **NO**
A/C Effect : **NO**
CO2 Effect : **NO**

Fuel Balance Calculated : **YES**
Emissions Calculated : **NO**

Calculate Fuel Balance

Calculate Emissions

Calculate All Years

Cancel

Related forms in COPERT 5 (3/4)

Stock & Activity Data

All

Undo Redo Import Export

Category	Fuel	Segment	Euro Standard	Stock [n]	Mean Activity [km]	Lifetime Cumulative Activity [km]	Fuel Balanced ~ Mean Activity [km]
Passenger Cars	Petrol	Medium	ECE 15/02	0	0		0
Passenger Cars	Petrol	Medium	ECE 15/03	0	0		0
Passenger Cars	Petrol	Medium	ECE 15/04	16,201.04	3,034.76	249,099.0	2,973.1
Passenger Cars	Petrol	Medium	Improved Conventional	0	0		0
Passenger Cars	Petrol	Medium	Open Loop	0	0		0
Passenger Cars	Petrol	Medium	Euro 1	84,370.58	4,525.31	225,000.5	4,433.36
Passenger Cars	Petrol	Medium	Euro 2	613,432.04	5,172.43	201,407.1	5,067.33
Passenger Cars	Petrol	Medium	Euro 3	909,521.24	5,915.67	147,669.5	5,795.47
Passenger Cars	Petrol	Medium	Euro 4	1,376,650.77	6,766.35	79,513.	6,628.86
Passenger Cars	Petrol	Medium	Euro 5	478,653.35	7,743.51	32,025.7	7,586.17
Passenger Cars	Petrol	Medium	Euro 6 up to 2016	0	0		0
Passenger Cars	Petrol	Medium	Euro 6 2017-2019	0	0	10,00	0
Passenger Cars	Petrol	Large-SUV-Executive	PRE ECE	231.76	2,271.14	42,437.5	2,224.99
Passenger Cars	Petrol	Large-SUV-Executive	ECE 15/00-01	0	0		0

OK Apply Cancel

Related forms in COPERT 5 (4/5)

Technology blends share

All

Undo Redo Import Export

Vehicle				Blend		Blend Energy Share		Fuel Balanced ~ Biofuel...		Fuel Balanced ~ Blend...	
Category	Fuel	Segment	Euro Standard	First Blend	Second Blend	First Blend [%]	Second Blend [%]	First Blend [%]	Second Blend [%]	First Blend [%]	Second Blend [%]
Light Commercial Vehicles	Petrol	N1-II	Euro 4	E5	E10	80%	20%	4.64%	0%	100%	0%
Light Commercial Vehicles	Petrol	N1-II	Euro 5	E5	E10	80%	20%	4.64%	0%	100%	0%
Light Commercial Vehicles	Petrol	N1-II	Euro 6 up to 2017	E5	E10	80%	20%	4.64%	0%	100%	0%
Light Commercial Vehicles	Petrol	N1-II	Euro 6 2018-2020	E5	E10	80%	20%	4.64%	0%	100%	0%
Light Commercial Vehicles	Diesel	N1-II	Conventional	B7	B20	80%	20%	7%	20%	98.18%	1.82%
Light Commercial Vehicles	Diesel	N1-II	Euro 1	B7	B20	80%	20%	7%	20%	98.18%	1.82%
Light Commercial Vehicles	Diesel	N1-II	Euro 2	B7	B20	80%	20%	7%	20%	98.18%	1.82%
Light Commercial Vehicles	Diesel	N1-II	Euro 3	B7	B20	80%	20%	7%	20%	98.18%	1.82%
Light Commercial Vehicles	Diesel	N1-II	Euro 4	B7	B20	80%	20%	7%	20%	98.18%	1.82%
Light Commercial Vehicles	Diesel	N1-II	Euro 5	B7	B20	80%	20%	7%	20%	98.18%	1.82%
Light Commercial Vehicles	Diesel	N1-II	Euro 6 up to 2017	B7	B20	80%	20%	7%	20%	98.18%	1.82%
Light Commercial Vehicles	Diesel	N1-II	Euro 6 2018-2020	B7	B20	80%	20%	7%	20%	98.18%	1.82%
Heavy Duty Trucks	Petrol	>3,5 t	Conventional	E5	E10	80%	20%	4.64%	0%	100%	0%
Heavy Duty Trucks	Diesel	Rigid <=7,5 t	Conventional	B7	B20	80%	20%	7%	20%	98.18%	1.82%
Heavy Duty Trucks	Diesel	Rigid <=7,5 t	Euro 1	B7	B20	80%	20%	7%	20%	98.18%	1.82%

Set main fuels

OK Apply Cancel

Thank you for your attention!

