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TEM and TER Joint Expert Meeting
Climate Change Workshop
9 October 2013, Bad Gastein, Austria

Evaluating CO_2 emissions in inland transport and climate change mitigation

The UNDA project on measurement and mitigation of transport sector emissions

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The UNDA project

(1/2)

2008 Call for funds by the UNECE Transport Division on the UN Development Account (UNDA)

2009 Project endorsed by the UN General Assembly
Duration: 3 years (January 2011 – December 2013)
Leading agency: UN ECE (Economic Commission for Europe)
Implementing entities: ECA, ECLAC, ESCAP & ESCWA (other UN Regional Commissions)

2010 Project document
Major phases and activities of this three-year project defined

Main objective: enhanced cooperation & planning for sustainable transport
Main focus: capacity building
Target: policy makers and technical experts

Project leveraging on the development of a modelling tool (called ForFITS) meant to be freely available for all UN Member States) capable to assist users in the selection of the most appropriate and effective measures to reduce CO_2 emissions in the inland transport sector (including road, rail and inland waterways)

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The UNDA project

(1/2)

2011 Project launched

Tasks and responsibilities of UNECE and other Regional Commissions defined in ToR

Development and distribution of a questionnaire to provide inputs for the preparation of a *global status report*, containing a review on existing statistical data, policy measures and assessment tools concerning CO_2 emissions in transport

2012 International Expert Meeting (IEM) (April) to disseminate information, share experiences, identify possible synergies with other stakeholders

Peer-review workshop to discuss the draft *global status report* and to give feedback on a *draft methodology* of the ForFITS tool (April)

Finalisation of the *global status report* (October)

Release of the prototype version of ForFITS (December)

2013 Release of the advanced prototype of ForFITS (2nd quarter)

Development of a user manual (also containing methodological information) (2nd and 3rd quarter)

Finalization of the ForFITS model (Summer)

Application in pilots, awareness-raising, capacity-building and training workshops (3rd and 4th quarter)

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ForFITS
Model requirements

Key requirements

Allow the estimation/assessment of emissions in transport
Allow the evaluation of transport policies for CO_2 emission mitigation

} Convert information on transport activity into fuel consumption and CO_2 emission estimates considering the influence of the demographic and socio-economic context, including policy inputs

Be developed as a software tool
Be freely available for users (e.g. national and local governments, general public)
Be developed between 2011 and 2013

Sectoral model (focused on inland transport only): we do not expect it to target the evaluation of overall effects on the economic growth

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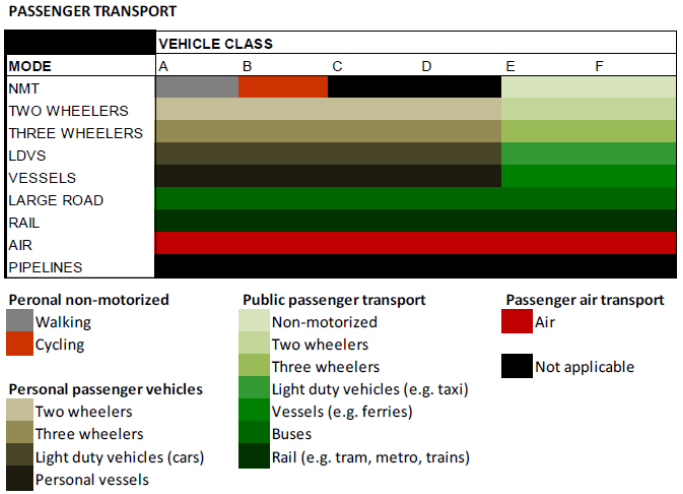
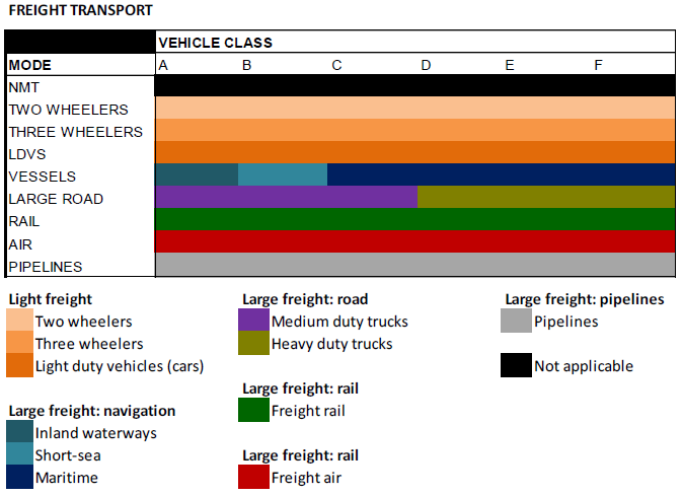
ForFITS model Coverage

- Passenger and freight transport services
- Two different areas (e.g. to define the transport systems: urban, non-urban, non-spec.)
- Nine transport modes: non-motorized transport, two wheelers, three wheelers, light road vehicles, medium and heavy road vehicles, rail, navigation (inland, short-sea and deep-sea/martime), air and pipelines
- Different vehicle subsets within each mode (organized in six vehicle classes – A to F) (figures)





- 31 powertrain technologies (e.g. internal combustion engines, hydraulic hybrids, electric hybrids, plug-ins, fuel cell, electric)
- 10 fuel blends, some of which are associated with specific modes and/or powertrains

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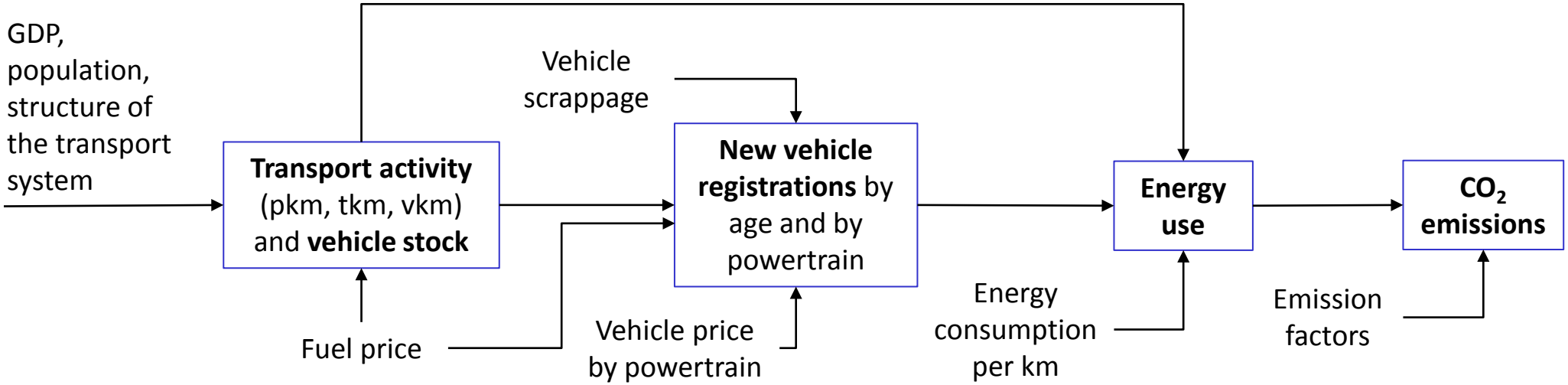
ForFITS model
Key modelling steps



Four key modelling steps

- Generation of **transport activity** (pkm, tkm, vkm) and **vehicle stock**
- Evaluation of **new vehicle registrations** by powertrain and characterization of the vehicles by age
- Calculation of the **energy use**
- Estimation of **CO_2 emissions**

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ForFITS model
Data requirements

Even if ForFITS has the capacity to adapt to different levels of data availability, the model does require a substantial amount of data, for:

- the characterization of the transport system in the base year (historical inputs)
- the definition of the context in which the transport system should evolve (projections)

Information on the initial and final times, the characterization of the areas, and the selection of the modelling approach for the powertrain choice (exogenous or endogenous), are also firm needs

Minimum data requirements (other inputs are defined by default data and can be modified)

Historical inputs

- GDP, population
- Vehicle stock: number of vehicles by powertrain, average travel and loads, average fuel consumption
- New vehicle registrations: same detail used for stocks needed for the base year, 5 and 10 years earlier (data in between are taken into account with linear interpolations)

Projections

- GDP and population
- Fuel prices (cost and taxation)
- Vehicle shares between two and three wheelers
- Pkm shares for different public transport modes (e.g. due to the construction of urban rail)
- Modal shares of light road freight vehicles
- Evolution of the network extension for pipelines
- With endogenous powertrain selection (optional), discount rate and powertrain shares

Need for coherence for inputs on each AREA, SERVICE, MODE, VEHICLE CLASS and POWERTRAIN

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ForFITS model
Data requirements

A wide set of default data are included in the ForFITS Excel file

These default data are used to characterizing several parameters of the ForFITS model

They concern the following input categories:

M Data absolutely required
Corresponding to the minimum data requirements

A Inputs expected to be introduced by the user
The default value in ForFITS is for guidance only
This category includes policy inputs that allow exploring different scenarios

B Input containing technical information (e.g. technological potential and costs by powertrain)
These data may be maintained unchanged
The defaults are set on the basis of research activities involving literature reviews and statistical analyses (further information on this is provided in the relevant section of the ForFITS manual)

C Inputs on structural characteristics of the model
Unless the users acquired significant experience with the model, these inputs shall not be modified: changes to these inputs will result in significant modifications to the model behaviour

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ForFITS model
Policy impacts or scenarios?

ForFITS may be used to evaluate policy impacts and to consider the effect of certain assumptions, characterizing scenarios

The coupling with policies, in the case of assumptions/scenarios, has to be worked out be the user aside from the model

ForFITS provides information on transport activity, vehicles, energy use and CO2 emissions taking into account for…

- Socio-economic growth scenarios (e.g. strong vs. weak GDP and/or population growth)
- Fuel cost scenarios (e.g. high vs. low oil price)
- Fuel taxation, including carbon taxes (need for proper characterization)
- Road pricing policies (caution needed when it is applied to portions of the network)
- Assumptions/scenarios on the evolution of the cost and performance of vehicle technologies
- Differentiated vehicle taxation (e.g. based on the vehicle technology)
- Assumptions/scenarios related to structural changes of the transport systems

  Passenger: modal shift policies, e.g. towards public transport from private vehicles

  Freight: modal shifts, e.g. due structural changes in the economy (such as relevance of imports & exports) and in the logistic system (such as local vs. long-distance sourcing)

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ForFITS users

Who may be interested in using ForFITS?

- Someone willing to understand the transport system he is concerned about (typically a geographical region), its impacts in terms of energy consumption and CO_2 emissions
- Someone having access to a sufficient amount of statistical information
- Someone having some degree of specific competence (transport, transport policies, energy policies, environmental policies)
- Someone having sufficient financial means to support his/her ambitions
- Someone from…
  - a national administration and/ore a local government
  - an Inter-Governmental Organization
  - a Non-Governmental Organization
  - an Academic institution and/or a consulting company
  - the industry sector (company/corporation, industry association)

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Beyond the project

ForFITS was conceived with the primary objective to evaluate contextually transport activity, energy consumption and CO_2 emissions

- Local, national, international applications possible
- Flexible with respect to data needs

The application of ForFITS can leverage on existing information, increasing the value already generated by their collection

Extensions of ForFITS can help answering a wide range of questions that are relevant for transport-, energy-, environment- and safety-related analyses, including:

- estimation of pollutant emissions
- interaction between transport networks and vehicle use
- evolution of fuel demand (e.g. via the integration of a choice model)
- additional vehicle technologies (beyond those already considered)
- vehicles and engines with special characterization (e.g. non-road mobile machines)
- material and energy demand (e.g. for the manufacture of transport vehicles)
- road-safety (e.g. fatalities, injuries and effect of road-safety policies)

ForFITS has the potential to become an important asset for the UN and its Member Countries

The UNECE Transport Division seeking stakeholders interested in the establishment solutions providing opportunities to maintain and further develop the model

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Links and contact information

Links

Project web page
http://www.unece.org/trans/theme_forfits.html

User manual, including methodological information
http://www.unece.org/trans/forfits_user_manual.html

Contact information

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