



Outline of the ForFITS model

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Transport and NAMAs –what progress?

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Background: the UNDA project

ForFITS model

- Model requirements
- Simplified structure
- Summary of key parameters (inputs, outputs)
- Model development
- Partners

Some useful links



UNDA project

Characteristics, activities, objectives and expected achievements

Characteristics

- 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)
- Main focus is on capacity building

Activities, objectives and expected achievements

- (a) Review of models looking at transport activity, energy consumption and CO₂ emissions
- (b) Development of a methodology for a tool analyzing CO₂ emissions mitigation policies in the transport sector (ForFITS model - "For Future Inland transport Systems")
Review and methodology were developed, presented and discussed in a meeting (held in April 2012), and are now available on-line on the UNECE web site
- (c) Development of the tool, validation and benchmarking - **Currently ongoing (model prototype expected by the end of the year 2012)**
- (d) Preparation of training materials (user manual) in all official UN languages and undertaking of pilot projects (e.g. a city per region making a detailed assessment and capacity-building effort) - **expected for 1st half of 2013**
- (e) Capacity-building and training workshops for government policymakers and industry stakeholders to raise awareness and provide skills for the use of the model - **2nd half of 2013**



ForFITS

Model requirements

(1)

Key requirements

- Allow the estimation/assessment of emissions in transport
- Allow the evaluation of transport policies for CO₂ mitigation

Convert information on transport activity into fuel consumption and CO₂ 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

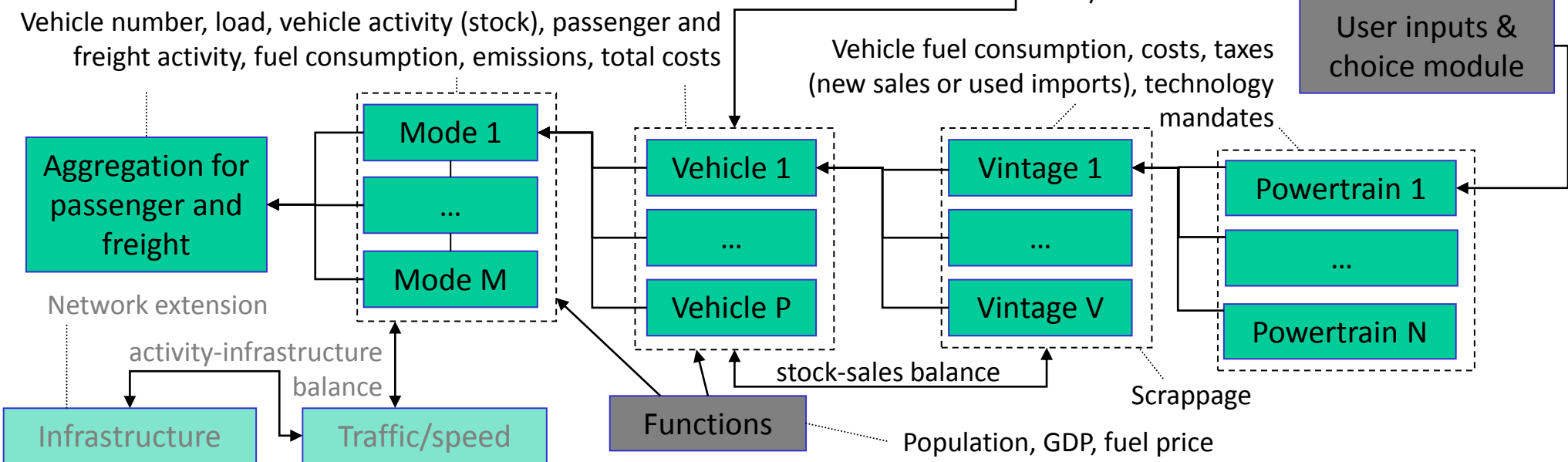
This tool can be very helpful for the preparation of transport-related NAMAs



ForFITS

Simplified structure

- Vehicles classified by... **service** (passenger, freight), **mode**, **class** & **powertrain**
- Fuels classified by **blend** and pathway
- Different **areas** (e.g. urban or not) in each region/country
- Congestion, speed, travel per vehicle may be included
- Imported used vehicles to be considered separately from (exogenous inputs or link to GDP per capita)





ForFITS

Key inputs and outputs

The model does require a substantial amount of data, in order to

- characterize the transport system in the base year
- define the economic system and the policy inputs in the future
- characterize technologies in analyzed time period (current, short term, long term)

Inputs (projections, policies, technologies)

- GDP, population, urbanization
- Discount rate
- Fuel prices (costs and taxes)
- Fuel mandates
- Vehicle characteristics
 - fuel consumption, powertrain shares, taxation
- Average scrappage age (for built-in scrappage function)
- Price elasticities of vehicle travel
- Average vehicle loads
- Modal split (for public transport & freight)
- Economic development characteristics
 - passenger: transit-oriented or not
 - evolution of the economic system (freight)
- Technological improvement and costs by powertrain (with choice module)
- Second hand imports, eventually network extension

Outputs

- Full information on vehicles (by mode, class, powertrain and age)
- Shares of powertrain technology used
- Share of fuel used
- Transport activity (pkm, tkm, vkm, time)
- Tonnes lifted, freight transport volume (t)
- Fuel use
- CO₂ emissions
- Total cost of vehicle and fuel purchase
- Total government revenues from taxes/cost of subsidies



ForFITS

Model development

Current status

- Review of similar model already carried out
- Detailed structure and equations already developed (methodological paper)
- We are developing the model in Vensim

Realistic near-term expectations

- Our target is to have a prototype version (stock model, fuel consumption and emission calculations, exogenous inputs for powertrains) ready by the end of 2012
- An evolved prototype (updated demand generation, choice modules for powertrains – possibly - and fuels, better policy input interfaces) expected for March 2013

Future/parallel steps

We need to:

- develop the documentation, together with the second prototype (early 2013)
- use the model in pilot projects (spring 2013)
- raise awareness about the availability of this tool
- prepare capacity building and training sessions (second half of 2013)

We are looking for partners



ForFITS

Partners

Our ideal partner for the pilot projects

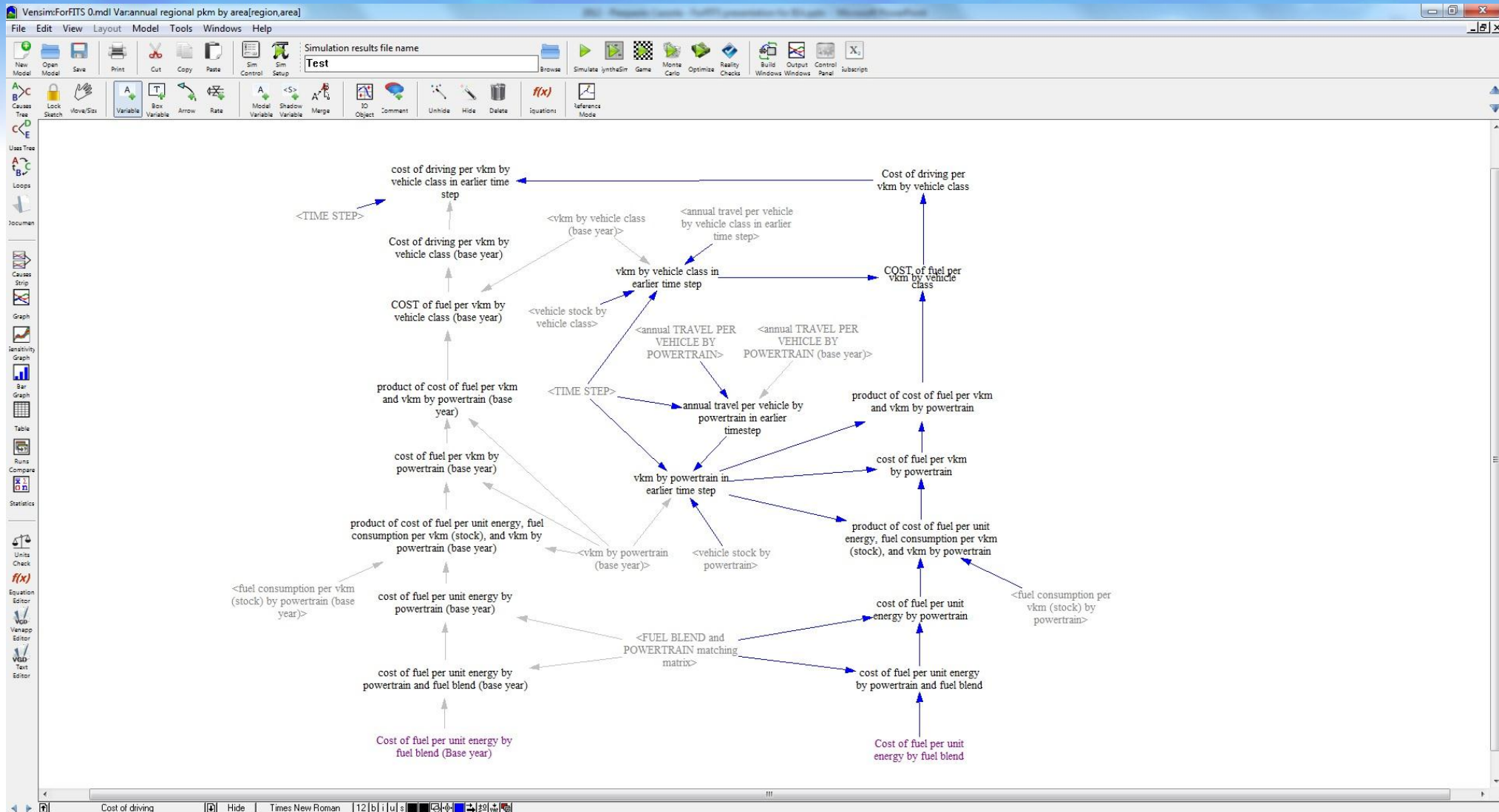
- someone willing to understand the transport system he is concerned about (typically a geographical region), its impacts in terms of energy consumption and CO₂ emissions
- someone having access to a sufficient amount of statistical information
- someone having some degree of specific competence (transport, transport policies, energy policies, environmental policies)
- someone having sufficient financial means to support his/her ambitions
- someone from...
 - a national administration and/or 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)



ForFITS

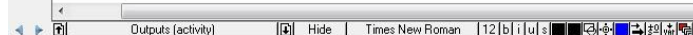
How it looks

Vehicle stock model





Aggregated outputs, transport activity





UNITED NATIONS
ECONOMIC COMMISSION
FOR EUROPE



ForFITS

How it looks

Excel user inputs interface

ForFITS Inputs 1.xls [Compatibility Mode] - Microsoft Excel

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For more information...

UNDA project page

http://www.unece.org/trans/theme_forfits.html

Useful links

- Review on statistics, mitigation policies, and modelling tools

[http://www.unece.org/fileadmin/DAM/trans/doc/themes/2012 - UNECE - Global Status Report October 2012 - final version.pdf](http://www.unece.org/fileadmin/DAM/trans/doc/themes/2012_-_UNECE_-_Global_Status_Report_October_2012_-_final_version.pdf)

- Methodology

[http://www.unece.org/fileadmin/DAM/trans/doc/themes/2012 - UNECE - Draft Concept document on ForFITS.pdf](http://www.unece.org/fileadmin/DAM/trans/doc/themes/2012_-_UNECE_-_Draft_Concept_document_on_ForFITS.pdf)

- International Expert Meeting

<http://www.unece.org/?id=29350>

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ForFITS

ASIF approach

Annexed slides
(1)

ASIF: Activity, Structure, Intensity, Fuel consumption

– Based on Laspeyres identities

$$F = \sum_i F_i = A \sum_i \left(\frac{A_i}{A} \right) \left(\frac{F_i}{A_i} \right) = A \sum_i S_i I_i = F$$

F total fuel use

A overall transport activity (expressed in vkm)

F_i fuel used by vehicles with a given set of characteristics (in the vehicle class i)

$A_i/A = S_i$ sectoral structure (expressed by shares of vkm by vehicle class)

$F_i/A_i = I_i$ energy intensity, i.e. the average fuel consumption per vkm by vehicle class

– The same methodological approach can be used to evaluate emissions derived from fuel consumption and with several energy carriers...

$$E = \sum_i E_i = A \sum_i \left(\frac{A_i}{A} \right) \left(\frac{F_i}{A_i} \right) \left(\frac{F_{ij}}{F_i} \right) \left(\frac{E_{ij}}{F_{ij}} \right) = A \sum_i S_i I_i E F_{ij} = E$$

E fuel-based emissions (e.g. for CO₂, the most relevant GHG in transport)

E_i fuel-based emissions due to the vehicle class i

F_{ij} fuel j used in the vehicle class i

$E F_{ij}$ emission factor of the fuel (energy carrier) j used in the vehicle class i



ForFITS

Multinomial logit (case of powertrain selection)

Annexed slides
(2)

It is based on the maximization of consumer utility

- in this case maximization of savings derived from the selection of one powertrain option with respect to the others

It requires the definition of the characteristics of all different options (the powertrains groups in each vehicle class, in this case) in order to characterize the utility of the individuals that have to select one of the choices

- Vehicle fuel consumption
- Vehicle and fuel prices - including costs, margins and tax rates
- Discount rates

Logit functions also need information on average vehicle travel (km/year)

- For vehicles with low technology shares (emerging technologies) the mileage should reflect likelihood that early adopters of more capital-intensive modes actually tend to travel more than average

Learning curves (e.g. reflecting technology cost reduction as cumulative production increases) can be incorporated

Similar considerations can be extended to the logit approach for fuel selection (lowest costs first...)