



75th Jubilee Session

INLAND TRANSPORT COMMITTEE, UNECE

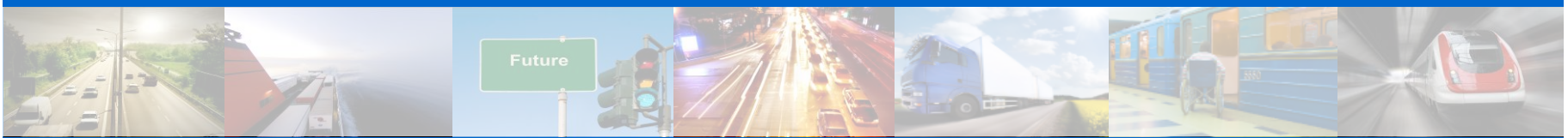
Mitigation of environmentally harmful effects of inland transport

For Future Inland Transport Systems (ForFITS)

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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 CO₂ emissions in the inland transport sector (including road, rail and inland waterways)



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 CO₂ 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](#) (February)

Model improvement and validation (2nd quarter)

Development of [final methodological note](#), [user manual](#) and training material (2nd quarter)

[Finalization of ForFITS](#) (end of 2nd quarter)

[Capacity-building and training workshops](#) (3rd quarter)



ForFITS characteristics

(1/2)

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



ForFITS characteristics

(2/2)

ForFITS covers

- Passenger and freight transport services
- Nine transport modes (non-motorized transport, two wheelers, three wheelers, light road vehicles, medium and heavy road vehicles, rail, inland navigation (inland, short-sea and deep sea), air and pipelines)
- Different vehicle subsets within each mode
- Several possible powertrains (e.g. internal combustion engines, hydraulic hybrids, electric hybrids, plug-ins, fuel cell, electric)
- Several fuel options (where suitable) for each powertrain

Transport demand is largely determined by the relationship linking GDP and GDP per capita with vehicle ownership, passenger kilometers and tonne kilometers

Transport demand characterizing each mode and vehicle class also depends on parameters affecting the driving cost of different vehicle types and the cost of different powertrain options



ForFITS

Selected key parameters (inputs, 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 (current status, short & long term)

Inputs (projections, policies, technologies)

- GDP, population
- Nature of sub-regions considered (e.g. urban, non-urban)
- Discount rate
- Fuel prices
- Vehicle characteristics
 - fuel consumption, powertrain shares, costs
- Average scrappage age (for built-in scrappage function)
- Price elasticities of vehicle travel
- Average vehicle loads
- Modal split (for public transport & freight)
- Technological improvement and costs by powertrain (with choice module)

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)
- Tonnes lifted, freight transport volume (t)
- Fuel use
- CO₂ emissions (well-to-tank, tank-to-wheel, well-to-wheel)
- Total cost of vehicle and fuel purchase
- Total government revenues from taxes/cost of subsidies



ForFITS development

Current status

- Review of similar model already carried out
- Detailed structure and equations already developed (methodological paper)
- Model prototype and advanced prototype already released

Near-term expectations

- Evolved prototype (updated demand generation, choice modules for powertrains -possibly - and fuels, better policy input interfaces) expected for March 2013

Future/parallel steps

- Documentation (2nd quarter of 2013)
- Use the model in pilot projects (2nd quarter of 2013)
- raise awareness (2013)
- capacity building and training sessions (second half of 2013)

Partners

Discussions on the implementation of the pilots are currently involving the International Energy Agency, the Joint Research Centre of the European Commission, and the International Council on Clean Transportation

We are looking for other interested 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)



Beyond the UNDA project

ForFITS conceived with the primary objective to evaluate contextually transport activity, energy consumption and CO₂ emissions

- It can consider issues with relevance at the urban, metropolitan, regional or national levels
- Wide range of data availability levels
- Local, national, international applications possible

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- and environment-oriented analyses, including:

- estimation of pollutant emissions
- interaction between transport networks and vehicle use
- evolution of fuel demand
- additional vehicle technologies (beyond those already considered)
- fuel and powertrain options on vehicles and engines requiring a special characterization (such as non-road mobile machines)
- material and energy demand for the manufacture and use of transport applications

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



ForFITS

Privileged partners: call for interest

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

- Methodology

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>

Contact details

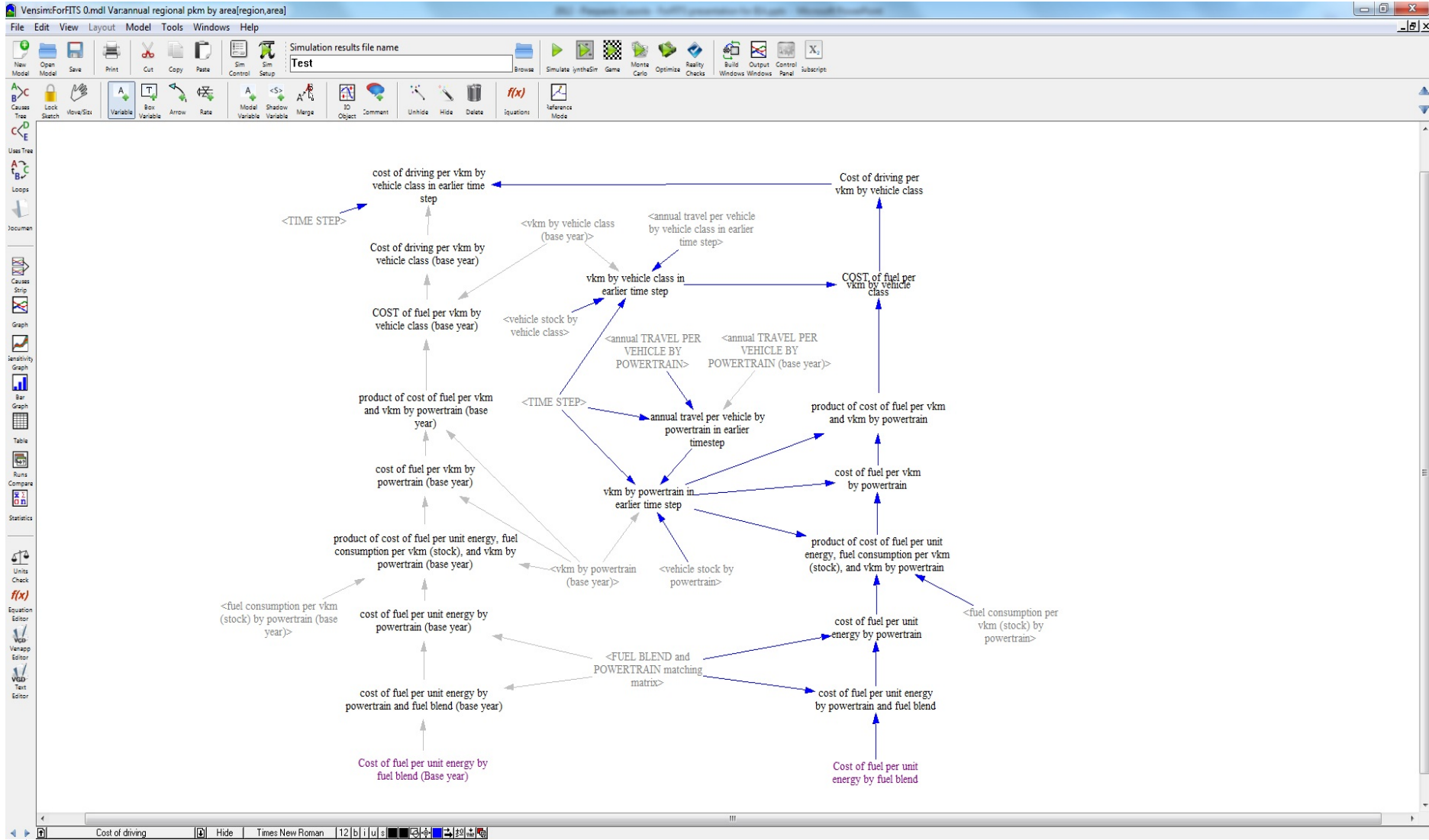
pierpaolo.cazzola@unece.org



ForFITS

Examples of views

(1/3)





ForFITS

Examples of views

(2/3)

VensimForFITS with demand generation, elasticity and sales Andy 31 Oct integral 13.mdl VarPowertrain shares (stock) by powertrain (BASE YEAR)[region,area,service,Mode,Vehicle class,powertrain]

File Edit View Layout Model Tools Windows Help

Simulation results file name: Test

pkm by powertrain

- annual regional vkm by service and mode
- annual regional vkm by area and service (except nmt and pipelines)

tkm by powertrain

- annual regional pkm by mode
- annual regional pkm by area
- annual regional tkm by mode (except nmt and pipelines)
- annual regional tkm by area (except nmt and pipelines)
- annual regional tkm by mode

The screenshot displays the Vensim software interface with several charts and legends. The charts are organized into two main sections: 'pkm by powertrain' and 'tkm by powertrain'. The 'pkm by powertrain' section includes 'annual regional vkm by service and mode' (Passenger and Freight) and 'annual regional vkm by area and service (except nmt and pipelines)' (Passenger and Freight). The 'tkm by powertrain' section includes 'annual regional pkm by mode' and 'by area', 'annual regional tkm by mode (except nmt and pipelines)', 'annual regional tkm by area (except nmt and pipelines)', and 'annual regional tkm by mode'. The charts show data from 2010 to 2038. The legends for the charts include: 2-3 wheelers, LDVs, Large road, Rail, Vessels, Air, Area I, Area II, Area III, Area IV, NMT, Public transport (road and rail), and Pipelines.



ForFITS

Examples of views

(3/3)

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

File Home Insert Page Layout Formulas Data Review View

Clipboard Font Alignment Number Styles Cells Editing

Font: Arial, 10, Bold, Italic, Underline, Text Color, Background Color, Bullets, Numbering, Merge & Center

General: Percent 2, Normal, Bad, Good, Neutral, Calculation, Check Cell, Explanatory..., Input, Linked Cell

Insert: Insert, Delete, Format, AutoSum, Fill, Clear, Sort & Filter, Select

A144 fx

1 USER INPUTS

2 BASE YEAR AND FINAL YEAR

BASE	FINAL
YEAR	2010 2040

3 POPULATION AND GDP

4 POPULATION (pop1)

AREA	ii	iii	iv	Check
SERVICE				
PASSENGER	8075944	14219425		OK
FREIGHT		1507554		

5 GDP (constant USD, PPP)

AREA	ii	iii	iv	Check
SERVICE				
PASSENGER	1.9E+12	2.2E+11		OK
FREIGHT		2.22E+10		

6 VEHICLE STOCK

7 NUMBER OF ACTIVE VEHICLES (VEHICLE STOCK) (x of vehicles)

Notes: New for passenger, each row corresponds to a "Vehicle". For freight, the input requires 4 separate rows corresponding to the annual volume transported, expressed in cubic meters.

SERVICE	MODE	AREA (i.e. USERR)						AREA (i.e. NONUSERR)						AREA (i.e. all areas)						Check	
		A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F		
PASSENGER	HMT	4613368	9154	0	0	0	0	5210483	25743	0	0	0	0	0	0	0	0	0	0	0	OK
		1474200	77230	0	0	0	0	425500	22700	0	0	0	0	0	0	0	0	0	0	OK	
		2494	312	0	0	0	0	794	88	0	0	0	0	0	0	0	0	0	0	OK	
		1073240	191520	244400	0	5420	0	404540	264220	159520	0	3712	0	0	0	0	0	0	0	OK	
		144200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	OK	
		7234	24100	300	0	3574	0	0	0	0	0	0	0	0	0	0	0	0	0	OK	
FREIGHT	PIPELINE	14100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	OK	
		912	0	0	0	0	0	33	0	0	0	0	0	0	0	0	0	0	0	OK	
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	OK	
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	OK	
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	OK	
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	OK	

8 POWERTRAIN GROUP SHARES IN EACH VEHICLE CLASS (VEHICLE STOCK) (x of vehicles in the same vehicle class)

SERVICE	MODE	VEHICLE CLASS	GASOLIN				DIESELOI				Check
			EPICE	HYBRID	METHANE	LPSPICE ICE	HYBRID	ELECTRO	Other	Other	
PASSENGER	TWO WHEELERS	A	100%	0%	0%	0%	0%	0%	0%	0%	OK
		B	100%	0%	0%	0%	0%	0%	0%	0%	OK
		C	100%	0%	0%	0%	0%	0%	0%	0%	OK
		D	100%	0%	0%	0%	0%	0%	0%	0%	OK
		E	100%	0%	0%	0%	0%	0%	0%	0%	OK
		F	100%	0%	0%	0%	0%	0%	0%	0%	OK
THREE WHEELERS	A	100%	0%	0%	0%	0%	0%	0%	0%	OK	
		B	100%	0%	0%	0%	0%	0%	0%	0%	OK
		C	100%	0%	0%	0%	0%	0%	0%	0%	OK
		D	100%	0%	0%	0%	0%	0%	0%	0%	OK
		E	100%	0%	0%	0%	0%	0%	0%	0%	OK
		F	100%	0%	0%	0%	0%	0%	0%	0%	OK
LGVs	A	100%	0%	0%	0%	0%	0%	0%	0%	OK	
		B	49%	1.2%	0%	0%	54%	0%	0%	0%	OK
		C	27%	1.4%	0%	0%	43%	0%	0%	0%	OK
		D	45%	1.2%	0%	0%	54%	0%	0%	0%	OK
		E	28%	1.4%	0%	0%	78%	0%	0%	0%	OK
		F	100%	0%	0%	0%	0%	0%	0%	0%	OK
LARGER ROAD	A	1.8%	2.3%	0%	0%	94%	0%	0%	0%	OK	
		B	1.8%	2.3%	0%	0%	94%	0%	0%	0%	OK
		C	1.8%	2.3%	0%	0%	94%	0%	0%	0%	OK
		D	1.8%	2.3%	0%	0%	94%	0%	0%	0%	OK
		E	1.8%	2.3%	0%	0%	94%	0%	0%	0%	OK
		F	1.8%	2.3%	0%	0%	94%	0%	0%	0%	OK
RAIL	A	0%	0%	0%	0%	100%	0%	0%	0%	OK	
		B	0%	0%	0%	0%	100%	0%	0%	0%	OK
		C	0%	0%	0%	0%	100%	0%	0%	0%	OK
		D	0%	0%	0%	0%	100%	0%	0%	0%	OK
		E	0%	0%	0%	0%	100%	0%	0%	0%	OK
		F	0%	0%	0%	0%	100%	0%	0%	0%	OK
FREIGHT	TWO WHEELERS	A	100%	0%	0%	0%	0%	0%	0%	0%	OK
		B	100%	0%	0%	0%	0%	0%	0%	0%	OK

Ready | User inputs (BASE Y) | Historical sales inputs (time) | Main user inputs (over time) | Detailed user inputs (time) | Inputs (BASE Y) | Inputs (time dependent) | 55%