road ERA net

MIRAVEC

MIRAVEC - Modelling Infrastructure influence on RoAd Vehicle Energy Consumption

PEB presentation

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Table of contents

1) Overview

2) Background

3) Objectives and output

4) Work packages

5) Timetable and deliverables

6) Current status and results

7) Next steps

Overview of MIRAVEC 1

Acronym:	MIRAVEC
Title:	Modelling Infrastructure influence on RoAd Vehicle Energy Consumption
Project Type:	Cooperative research
Call:	ERA-NET ROAD 2, Energy: Sustainability and Energy Efficient Management of Roads
Call objective:	C) Determine the most important Road Infrastructure Characteristics which influence Vehicle Energy Consumption
PEB:	Germany, Denmark, Ireland, Netherlands, Norway, Sweden and United Kingdom
PM:	FFG, Austria

Overview of MIRAVEC 2

Submission date:	31 March 2011
Funding offer:	27 June 2011
Acceptance:	22 July 2011
Project start:	1 November 2011
Project end:	31 October 2013
Duration:	2 years (24 months)
Budget:	EUR 290.000,- incl. VAT
Funding:	100%, i.e. EUR 290,000 incl. VAT
Contracts:	Contract for Services (FFG-AIT)
	Consortium Agreement (all partners)

Overview of MIRAVEC 3

Partner	Name	Country	Roles
Coordinator	AIT	Austria	WP1, WP5 leader
1	TRL	UK	WP3 leader
2	VTI	Sweden	WP2 leader
3	ZAG	Slovenia	WP4 leader
4	CDV	Czech Republic	WP4 contribution
5	FEHRL	Belgium	Task T5.2 & 5.3 leader

MIRAVEC background

- CO_2 emissions from road transport contribute to overall GHG emissions
- Reduction efforts are essential – how can NRAs contribute?
- Improvement of road infrastructure can contribute to emission reduction
- Requirements:
  - Understanding and modelling of vehicle-road interaction
  - Implementation of results in asset management

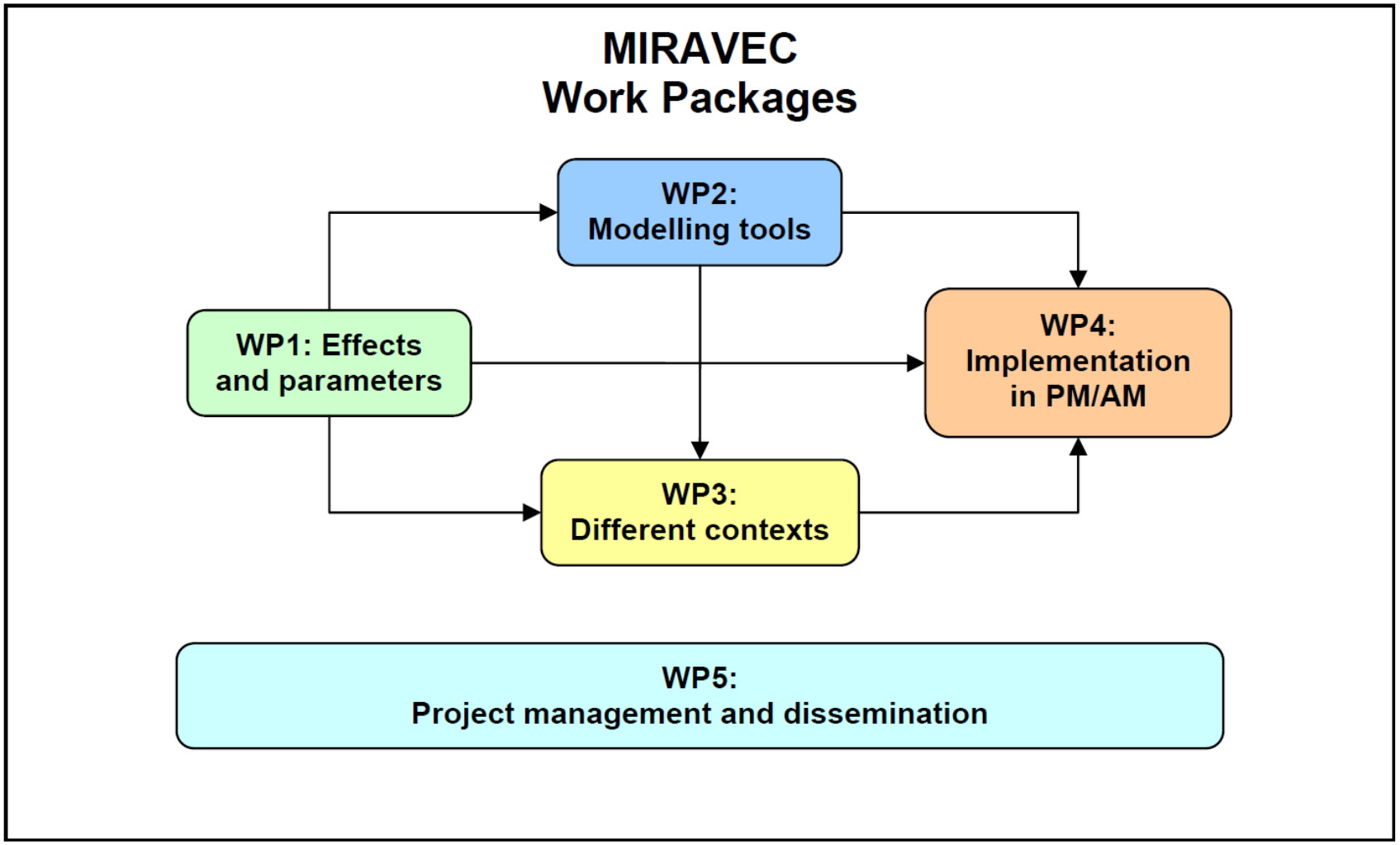
MIRAVEC objectives and output

- **Provide recommendations for road infrastructure design and operation leading to reduced energy consumption and associated reduced CO2 emissions from road transport**
- Final output of MIRAVEC: a report containing
  - recommendations on the relevant effects and parameters
  - their importance in different contexts
  - the available modelling capabilities and
  - their implementation in pavement and asset management

MIRAVEC activities

- Holistic view considering a broad variety of effects
- Investigation of the capabilities of available models and tools
- Evaluation of the relative importance of different road infrastructure characteristics for different settings
- Recommendations to NRAs on how to implement the findings, models and tools in pavement and asset management systems
- Dissemination

MIRAVEC work packages



MIRAVEC WP1

Title: **Road infrastructure influence effects on vehicle energy consumption and associated parameters**

Partners: AIT (Leader), TRL, VTI, ZAG, CDV

Duration: M1 - M9

Activities: Identify the most important effects contributing to road vehicle energy consumption which are governed by interaction with the infrastructure and associated parameters

Output: D1.1 Report on the road infrastructure effects contributing to road vehicle energy consumption and their governing parameters

MIRAVEC WP2

Title:	**Evaluation of modelling tools to achieve a comprehensive and detailed overview**
Partners:	VTI (Leader), AIT, TRL, ZAG, CDV
Duration:	M4 – M15
Activities:	Evaluation of modelling tools for the effects defined in WP1 Currently available tools and their capabilities Possible improvements in performance and scope Possibilities for integration of different tools Remaining gaps
Output:	D2.1 Report on models and methods for the estimation of effects related to WP1 parameters including estimation of energy saving potentials

MIRAVEC WP3

Title:	**Comparison of the relative importance of different effects and parameters in different contexts**
Partners:	TRL (Leader), AIT, VTI, ZAG, CDV
Duration:	M10 – M20
Activities:	Assess the relative importance of the effects from WP1 in different contexts and settings Evaluation of the potential savings in vehicle energy use achievable by NRAs actions Effects of changing vehicle fleets (electric vehicles!)
Output:	D3.1 Report on the potential for NRAs to provide energy reducing road infrastructure

MIRAVEC WP4

Title:	**Recommendations for implementation in pavement/asset management**
Partners:	ZAG(Leader), AIT, TRL, VTI, CDV
Duration:	M7 – M24
Activities:	Investigate the current role of road vehicle energy consumption in road asset management Make specific recommendations how to implement the available knowledge and/or models Support energy efficiency considerations in the decision making processes of NRAs
Output:	D 4.1 Recommendations for implementation of road vehicle energy consumption in pavement and asset management systems

MIRAVEC WP5

Title:	**Project management and dissemination**
Partners:	AIT(Leader), FEHRL
Duration:	M1 – M24
Activities:	Organizational and financial administration, progress management, contact with PEB and PM Dissemination: dissemination strategy, project website, logo, leaflet, presentations, newsletter, workshops, final event International cooperation (Virginia Tech, FHWA) Paper on final results for TRA 2014
Output:	D5.1 Dissemination Strategy Report D5.2 Interim progress report D5.3 Final report

MIRAVEC timetable (updated)

	2011			2012									2013											
	Q1			Q2			Q3			Q4			Q5			Q6			Q7			Q8		
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
WP1				M1.1			M1.2						D1.1											
WP2						M2.1									M2.2			D2.1						
WP3																M3.1				D3.1				
WP4																M4.1							D4.1	
WP5			M5.1	D5.1		M5.2 M5.3						M5.3	D5.2					M5.3						M5.3 M5.4 D5.3

1st MPR

2nd MPR

3rd MPR

4th MPR

MIRAVEC Deliverables

No	Deliverable Name / Report Name	Due date
D5.1	Dissemination Strategy Report	02/2012 (M4)
	1st Monitoring progress report incl. cost statements (1st MPR)	05/2012 (M7)
D1.1	Report on the road infrastructure effects contributing to road vehicle energy consumption and their governing parameters	07/2012 (M9) 11/2012 (M13)
D5.2	Interim progress report = 2nd MPR	11/2012 (M13)
D2.1	Report on models and methods for the estimation of effects related to WP1 parameters including estimation of energy saving potentials	01/2013 (M15) 04/2013 (M18)
	3rd MPR	05/2013 (M19)
D3.1	Report on the potential for NRAs to provide energy reducing road infrastructure	06/2013 (M20)
D4.1	Recommendations for implementation of road vehicle energy consumption in pavement and asset management systems	09/2013 (M23)
D5.3	Final report = 4th MPR	10/2013 (M24)

MIRAVEC Current status update

Current status:

- Work on WP 1, 2 and 3 has started
- Project website online
- Dissemination Strategy Report – finalized after PEB feedback in May 2012
- Deliverable D1.1 delayed, currently in draft status, shifted to Nov 2012
- Deliverable D2.1 shifted to April 2013
- Budget used so far: approx. EUR 98,000
- Next working meeting: Personal meeting on 4 December 2012

MIRAVEC results

Work package 1

Task 1.1: Inventory of infrastructure effects contributing to vehicle energy consumption

Collection of relevant effects into 4 groups:

A) Effects of pavement surface characteristics

B) Road design and layout

C) Interaction with the traffic flow

D) Potential effects of current trends in vehicle and tyre development

Added 5th group for E) Meteorological effects

MIRAVEC results

Work package 1

Task 1.2 Parameters describing road infrastructure effects

Association of relevant effects with parameters (examples):

Name of effect	Group	NRA influence	Parameters
Longitudinal unevenness	A	Yes	IRI
Texture	A	Yes	MPD, texture spectrum
Cracks	A	Yes	Crack type and density
Transversal unevenness	A	Yes	Crossfall
Horizontal alignment	B	Yes	Horizontal curvature
Vertical alignment	B	Yes	Gradient
Intersections, junctions	B	Partially	Type of intersection
Speed	C	Partially	Speed limit, design speed
Traffic flow	C	Yes	Speed distribution, road category, selected gear
Composition of traffic	C	Partially	Distribution of vehicle types
Engine friction	D	No	Loss coefficient
Tyre losses	D	No	Loss coefficient
Presence of water	E	Partially	Water film thickness
Presence of snow	E	Partially	Snow thickness

MIRAVEC results

Work package 1

Task 1.3 Compilation and input to WP2

Selection for WP2:

Name of effect	Group	NRA influence	Parameters
Longitudinal unevenness	A	Yes	IRI
Texture	A	Yes	MPD, texture spectrum
Rutting	A	Yes	Rut depth
Horizontal alignment	B	Yes	Horizontal curvature
Vertical alignment	B	Yes	Gradient
Road layout	B	Yes	Road width
Speed	C	Partially	Speed limit, design speed
Composition of traffic	C	Partially	Distribution of vehicle types

MIRAVEC results

Work package 2:
Task 2.1: Description of models used in other projects

IERD project (Integration of the Measurement of Energy Usage into Road Design)

- Development of the JouleSAVE software (aimed at road engineers)
- Potential energy savings in the construction and operational phases
- Traffic energy was included for three categories: cars, trucks and trucks with trailers
- Considered parameters: Road geometry, road surface, road surface conditions, meteorological conditions, vehicle details and driving behaviour
- Programmes used: VETO

MIRAVEC results

Work package 2:
Task 2.1: Description of models used in other projects

ECRPD (Energy conservation in road pavement design, maintenance and utilisation)

- Evaluation of energy conservation in pavement manufacture and placement
- Low energy pavement materials and pavement maintenance on existing roads
- Energy saving in road maintenance in order to save fuel use by vehicles
- Programmes used: VETO, JouleSAVE

MIRAVEC results

Work package 2:
Task 2.1: Description of models used in other projects

MIRIAM (Models for rolling resistance In Road Infrastructure Asset Management systems

- Provides information useful for achieving a sustainable and environmentally friendly road infrastructure
- Reducing the energy use due to the tyre/road interaction (i.e. focused on group A of WP1)
- Selection/design of pavements with lower rolling resistance
- Ongoing project, now defining activities for Phase 2
- Programmes used: VETO, FTire & Dymola/Modelica

MIRAVEC results

Work package 2:

Task 2.2: Evaluation of these projects in order to identify deficiencies and strengths

Software tools for traffic energy/emission simulation:

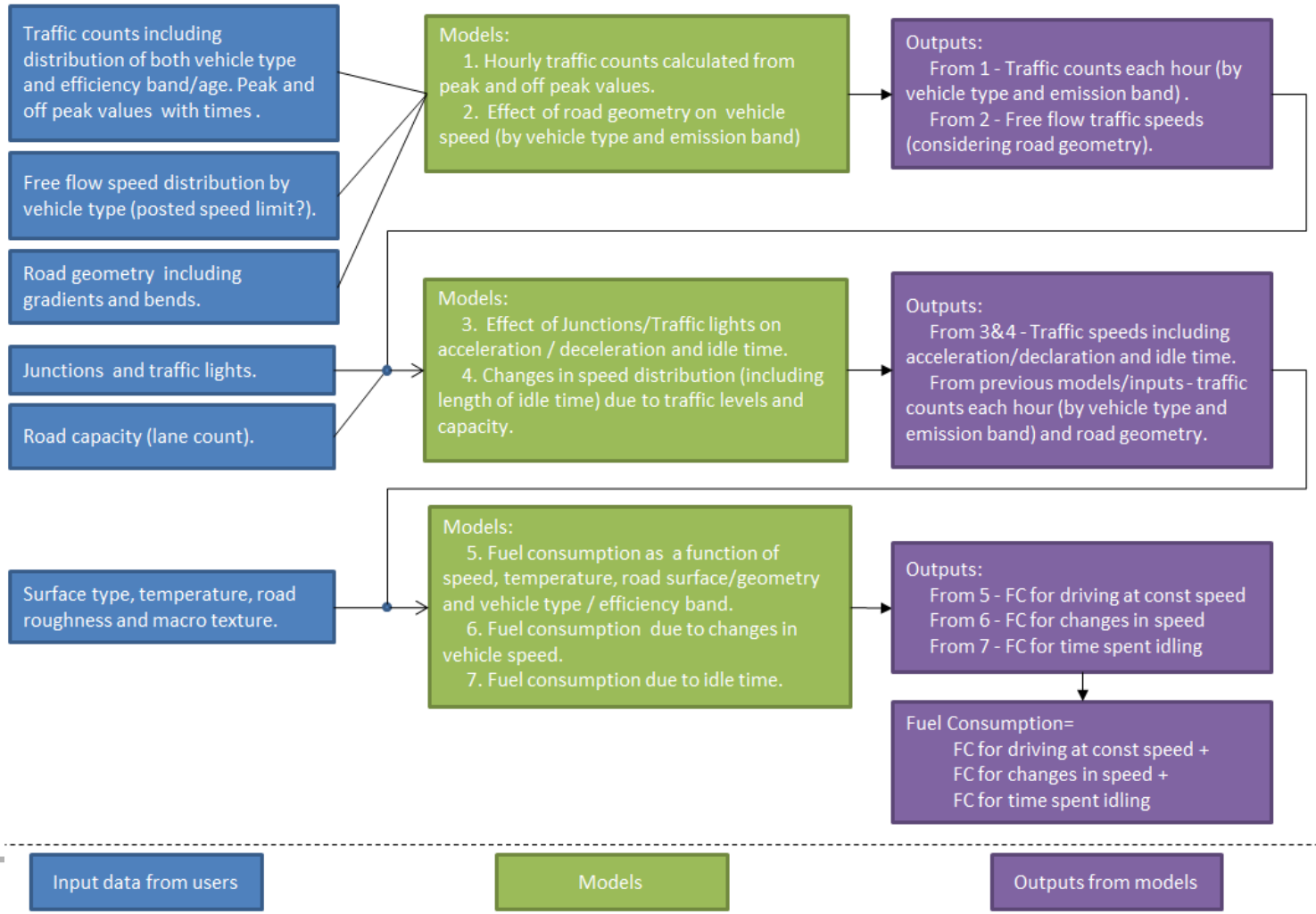
VETO	Swedish
JouleSAVE	European
HDM	World bank
MOVES	USA, EPA
EVA	Swedish
HBEFA (ARTEMIS)	European
PHEM, FTire/Dymola	Austria
Landsbygdsmodellen	Swedish
CMEM	USA

Next steps:

- Analysis of the parameters included in these models (Tasks 2.2, 2.3)
- Proposals for the inclusion of further parameters (Task 2.2)
- Uncertainty analysis (Task 2.4)

MIRAVEC results

Work package 3, Task 3.1: Develop methodology for estimating vehicle energy use



MIRAVEC results

Work package 4:

Task 4.1 Identification of the current role of road vehicle energy consumption and CO_2 emissions in existing systems and of opportunities for improvement

- Information collection ongoing

- Preparation of content for interviews

MIRAVEC next steps

Next steps:

- Finalization of Deliverable D1.1
- Analysis of parameters in Task 2.3 of WP2, preparation for D2.1
- Further development of the spreadsheet tool in WP3
- Analysis of current role of road vehicle energy consumption and CO_2 emissions in WP4
- Next working meeting: Consortium meeting on 4 December 2012

Thank you for your attention!