

**Promoting alternative automotive technologies and
alternative fuels – major insights from the EU-project
“ALTER-MOTIVE”**

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eccee, 2011

ALTER-MOTIVE

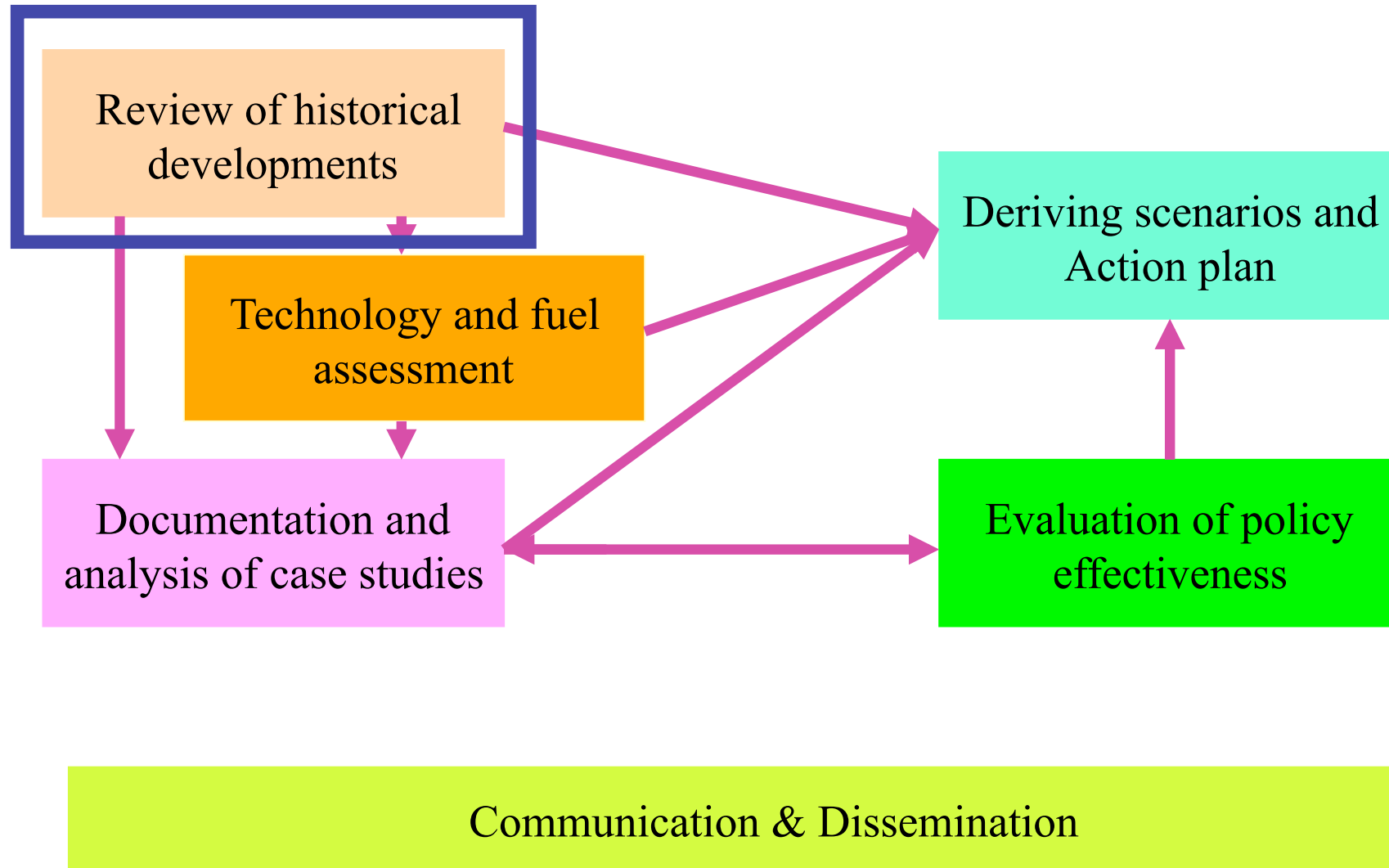
- **Coordinator:**
 - EEG, Vienna University of Technology

- **Partners:**
 - Energy research Center of the Netherlands, ECN, The Netherlands
 - Eni Corporate University S.P.A., Italy
 - IREES, Germany
 - Wuppertal Institut für Klima, Umwelt, Energie GmbH, Germany
 - AEOLIKI Ltd, Cyprus
 - Black Sea Energy Center, Bulgaria
 - Association Rhônealpiénergie-Environnement, France
 - Centre for Renewable Energy Sources, Greece
 - Stowarzyszenie The Kraków Institute for Sustainable Energy, Poland
 - Chalmers Tekniska Högskola Aktiebolag, Sweden
 - Forschungsgesellschaft Mobilität-Austrian Mobility Research, Austria
 - Sociedade Por Quotas CEEETA-ECO, Portugal
 - Det Økologisk Råd (EcoCouncil), Denmark

Objective of the Project ALTER-MOTIVE

- The **core objective** of this project is to derive effective least-cost policy strategies to achieve a significant increase in innovative alternative fuels (AF) and corresponding alternative more efficient automotive technologies (AAMT) to head towards a sustainable transport system.

Project Overview



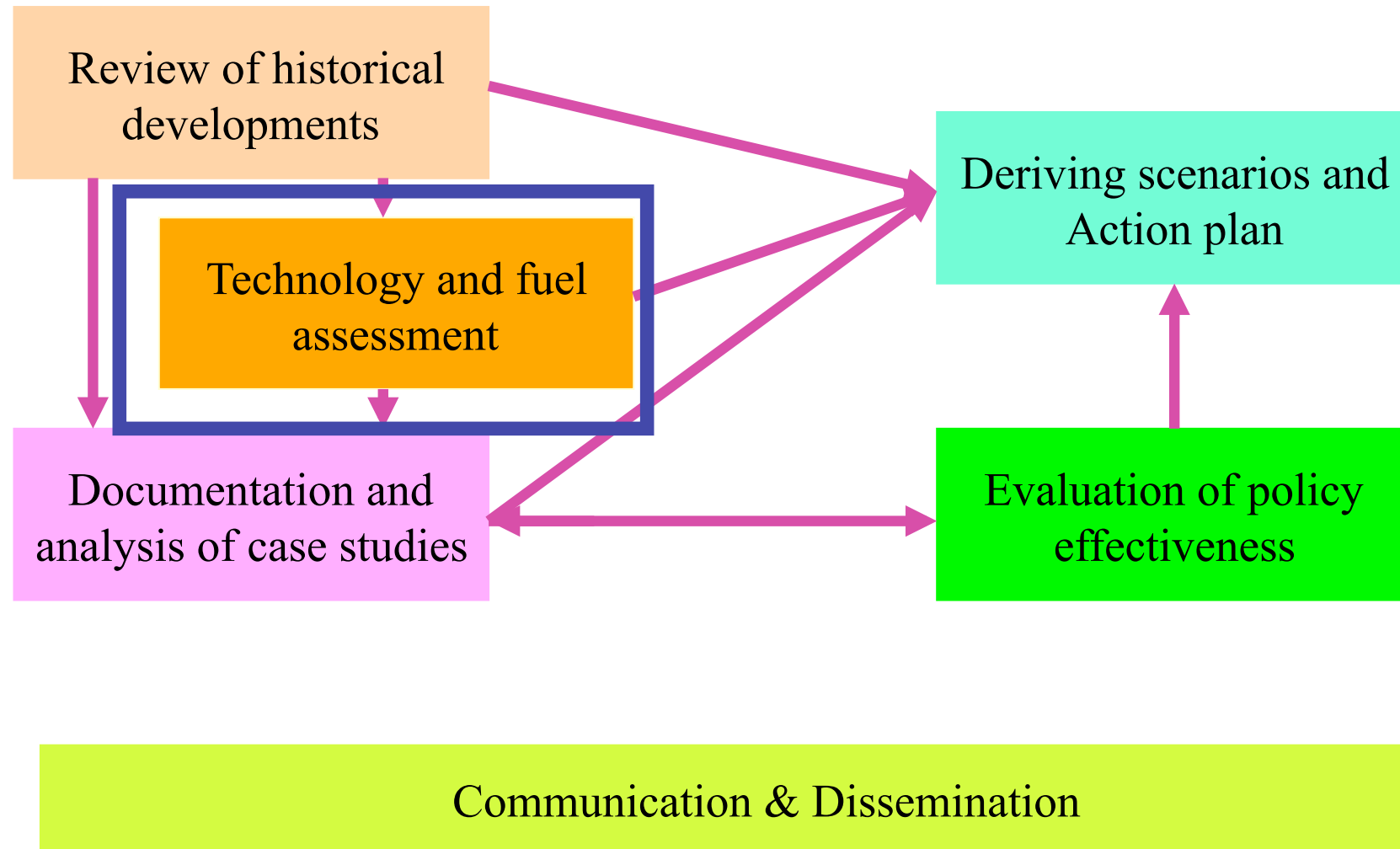
Review of historical developments

Cross-country comparison of the major indicators in EU

- *Amount of fuel used* (energy consumption of passenger cars)
- *Biofuels consumption and production,*
- *Fuel price,*
- *Vehicle stock* (including the number and type of vehicles),
- *Travel activity* (vehicle-km driven),
- *Fuel intensity* (litre/100 km)
- *Policy instruments implemented* (types of taxes, tax levels and tax incentives, CO₂ dependent policies, subsidies...)

- Country review report

Project Overview

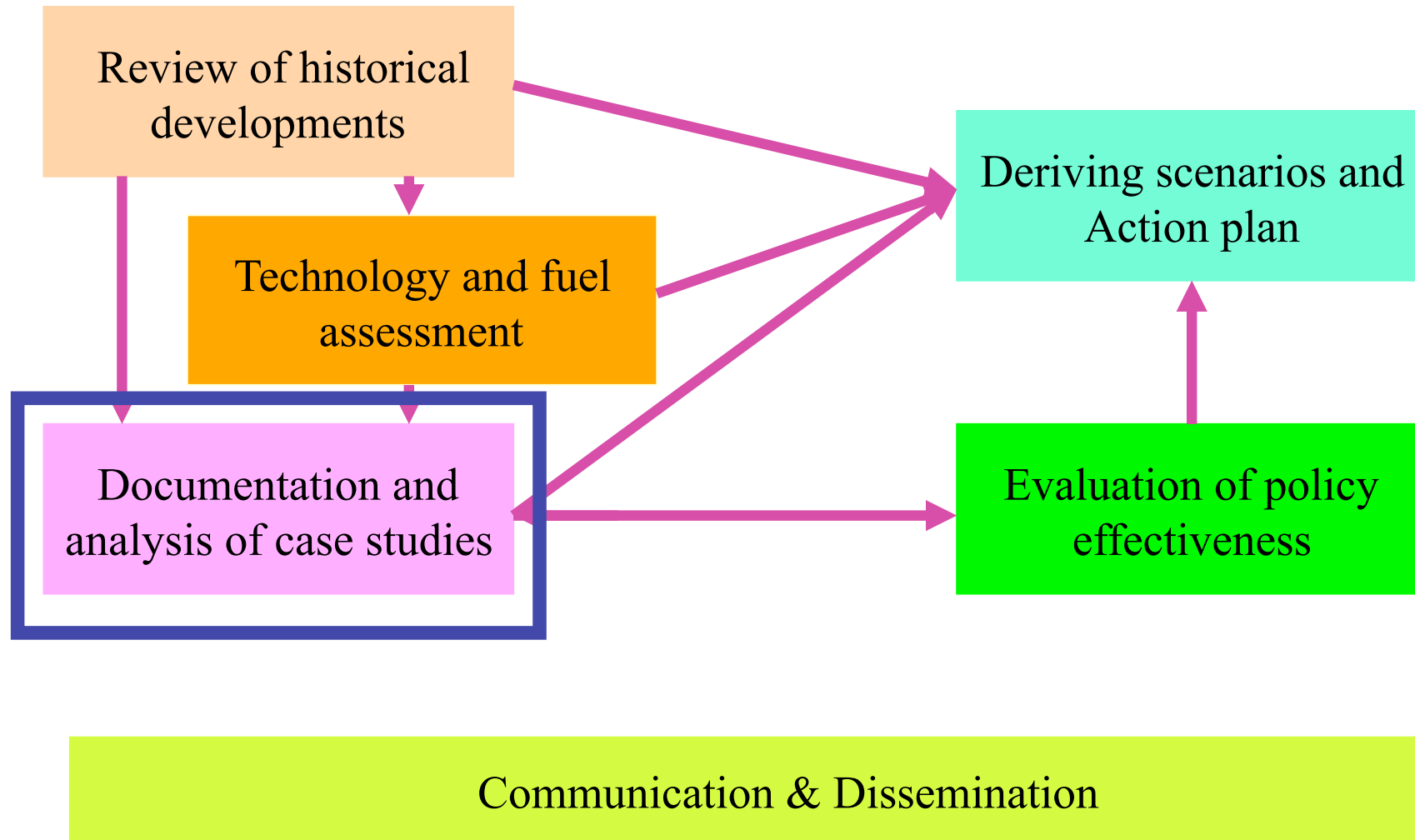


Technology and fuel assessment

- Comprehensive ecological, economic and technical/energetic assessment of all AF&AAMT
- State of the art and technical improvement potentials
- Supply side potential

- Assessment of current state-of-the-art of AF and AAMT

Project Overview



Case studies

(BIO) gas local fuel station

The biogas processing unit plus biogenic CNG filling station in Margarethen am Moos is the smallest commercially run facility of its kind anywhere in the world. Its simple, compact design has advantages both for operation and economically.

Background

The project (BIO) gas local fuel station lasted from January 2007 to September 2008.

The upgrading plant and the local fuel station were implemented in Margarethen am Moos near Schwechat at the site of a 500kW biogas plant. The biogas plant delivers the additional biogas that is converted into fuel by simply increasing its biomass input.

This project was initiated by TBB Consulting in cooperation with EVM (Energie Versorgung Margarethen am Moos), Vienna University of Technology, AGRAR PLUS, AXIOM, BAUER-Poseidon (fuel station), FIAL and LUKENEDER.

Major targets

The goal of the project (BIO) gas local fuel station was to erect Austria's first biogas-upgrading plant in connection with a local fuel station without any connection to a natural gas grid.

The proper technique for the local upgrading plant is the membrane technique. With an average turnout of 33 Nm³ biomethane (methaPUR) it is the smallest commercially running upgrading plant in Europe. Throughout the project the membranes could always deliver the needed gas-quantity and gas-quality. The upgrading plant also was capable to operate in the supply on demand mode, by turning off/on when needed. The offgas from the upgrading plant is reinjected into the biogas plant and converted into heat and power by the installed gas engine. This makes the upgrading station a zero emission plant, because there is no energy

Major results and lessons learned

The project goal has been achieved completely. Currently the fuel station has about 30 customers.

From the beginning the project was funded by the Land NÖ as well as ÖKK and FFG. The total costs of the project of about 642.000 EUR (442.000 investments costs and 200.000 operation and maintains costs) are covered mostly by FFG (94.000 EUR), Land NÖ (150.000 EUR) and ÖKK (143.650 EUR). The remaining costs were paid by the operator of the plant, the EVM.

The public was informed about this project through different activities such as presentations, nomination for Klimaschutzpreis 2008, as well as the win of the NÖ Energy Globe 2008.

After the success of demonstration-plant in Margarethen am Moos it is now planned, to find 25 more locations in Austria to construct an upgrading plant and a local fuel station similar to Margarethen am Moos.

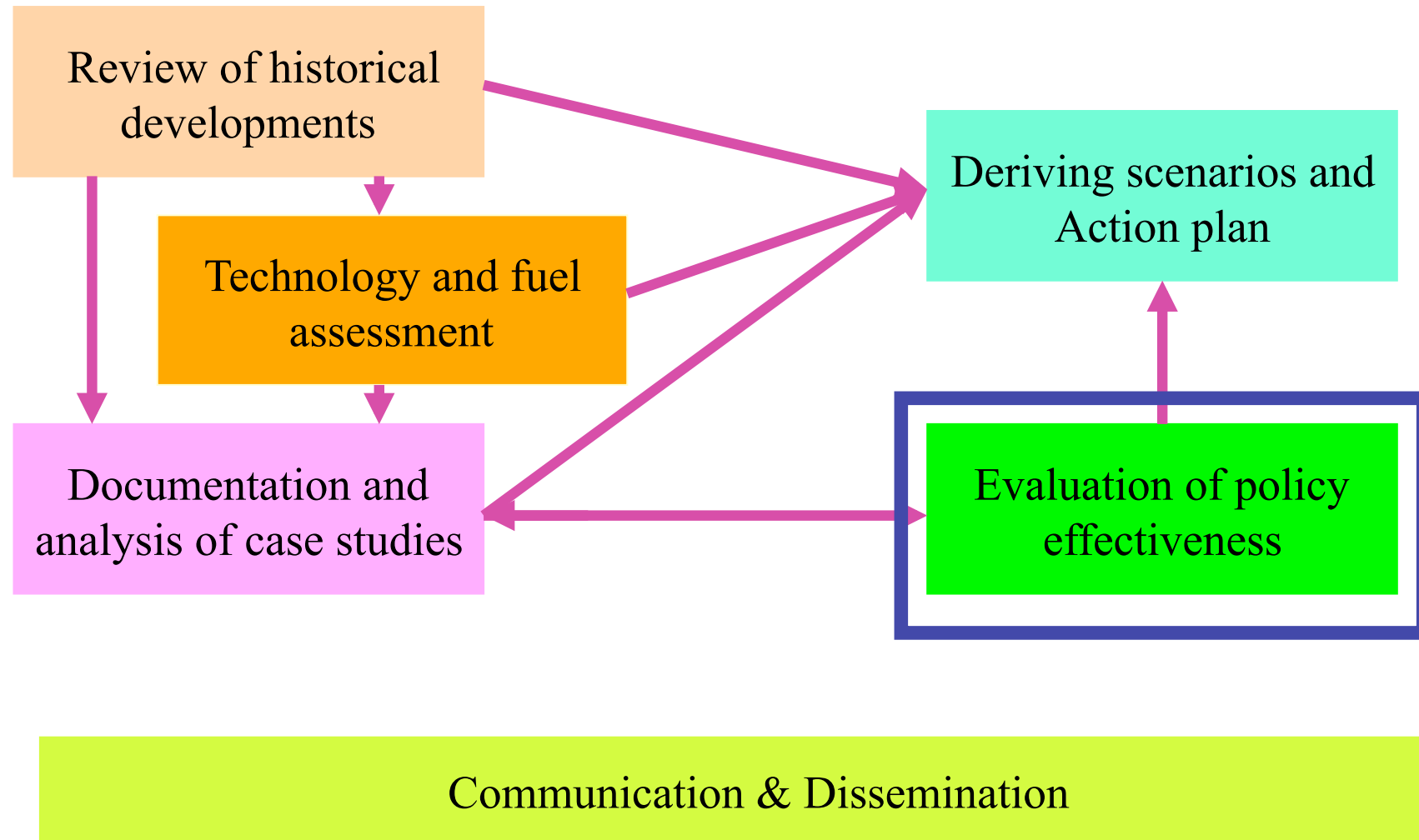
More information

TBB Consulting
DI Harald Bala MSc

www.methapur.com

- Summary report on case studies of pilot projects incl. documentation and comprehensive assessment

Project Overview

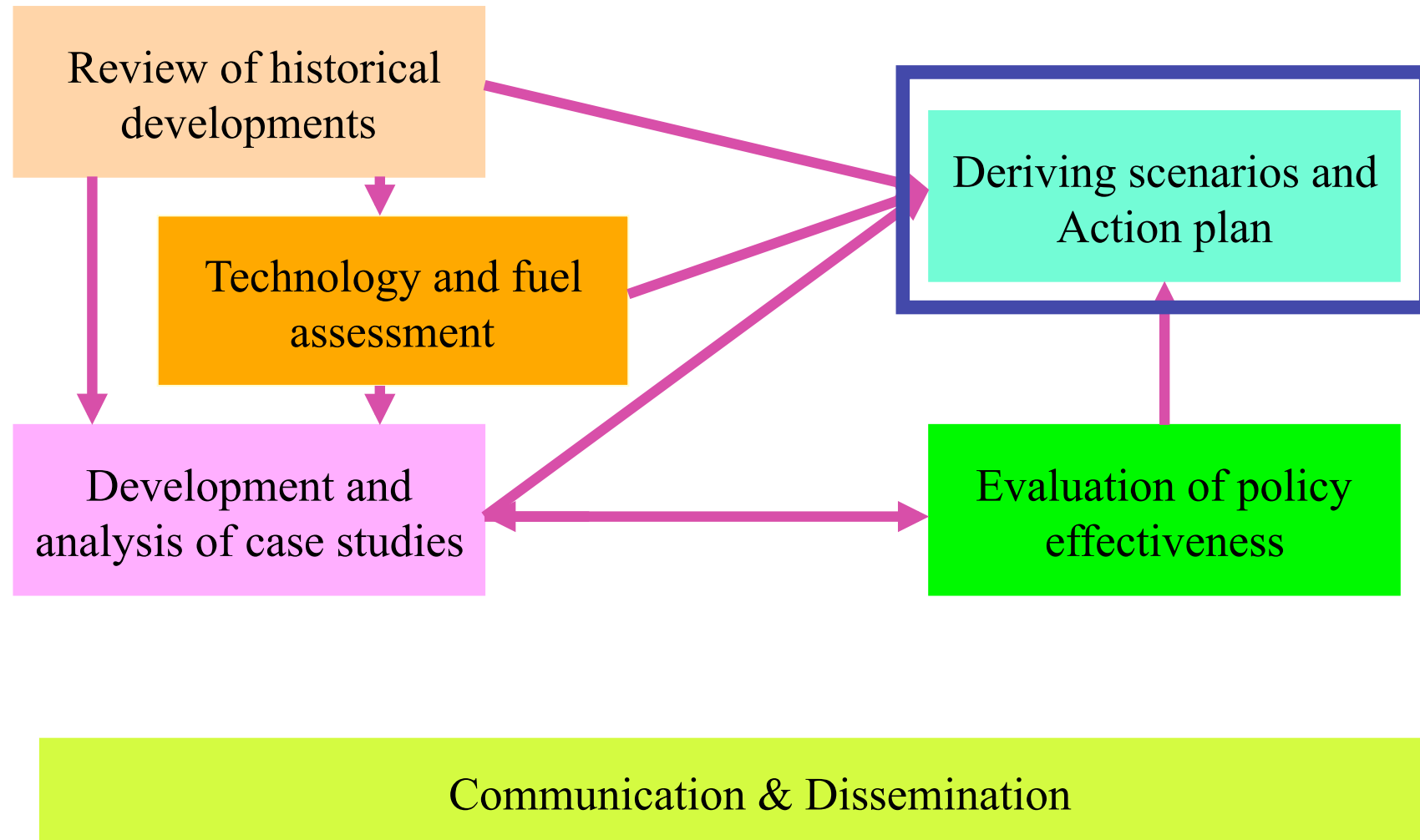


Evaluation of policy effectiveness

- To find out which policy instruments are most appropriate in which technological development phase
- Development of a validated toolbox that can be used to identify the most suitable policy instrument for a certain technology at a given point of development

- Policy evaluation report

Project Overview



Deriving scenarios and action plan

- ... to derive scenarios and to formulate precise and concrete recommendations in an action plan
- The scenarios derived for selected EU countries should show which developments are possible in the next years if the proper policies are implemented.
- Web tool: Play Policy Maker!
 - BAU scenario
 - Policy scenarios

Play policy-maker:

- Select countries
- Show business-as-usual scenario
- Edit policy
- Results

Select countries

- EU-15
- AT
- DE
- SE
- NL.....

Show business-as-usual scenario

- Show assumptions (GDP, price increase...)
- Start demo version

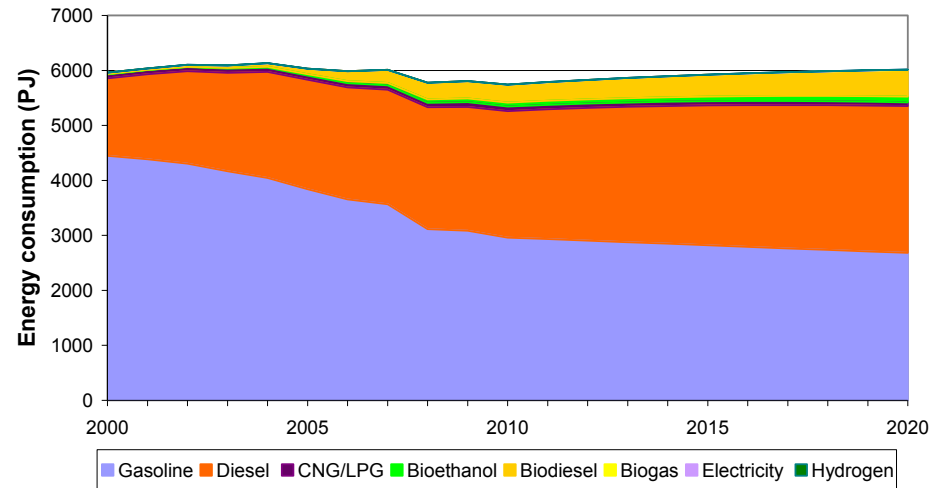
Edit policy

- Biofuels (Quote, tax, subventions...)
- Standards
- Fuel tax
- Car taxes
- Quotas
- Procurement Policies

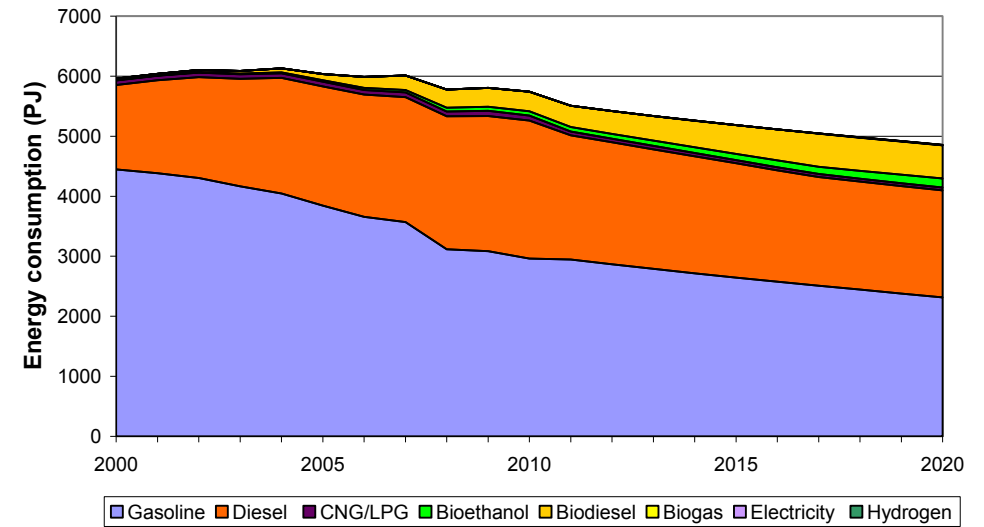
Select results:

- Energy consumption by fuel
- CO2 by fuel
- Vehicle stock
- New car registrations
- Policy scenario versus BAU

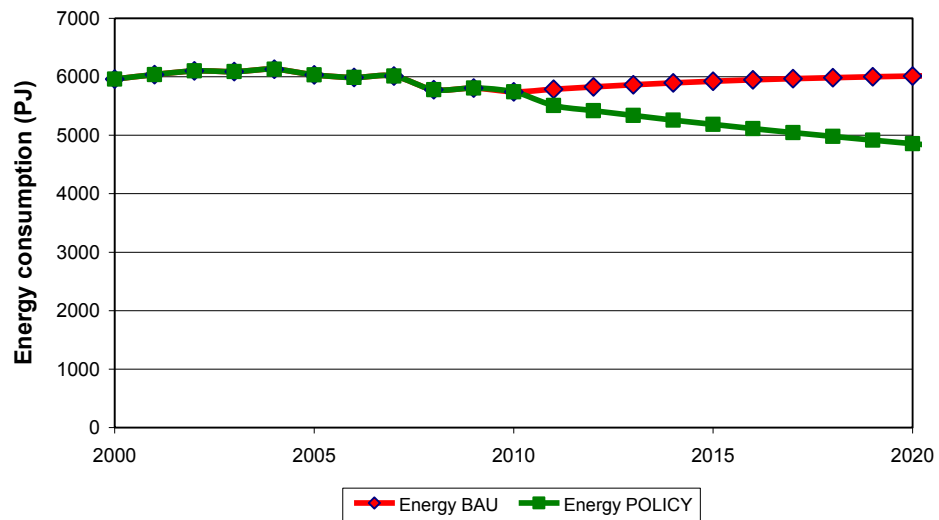
EU-15: BAU: Energy consumption



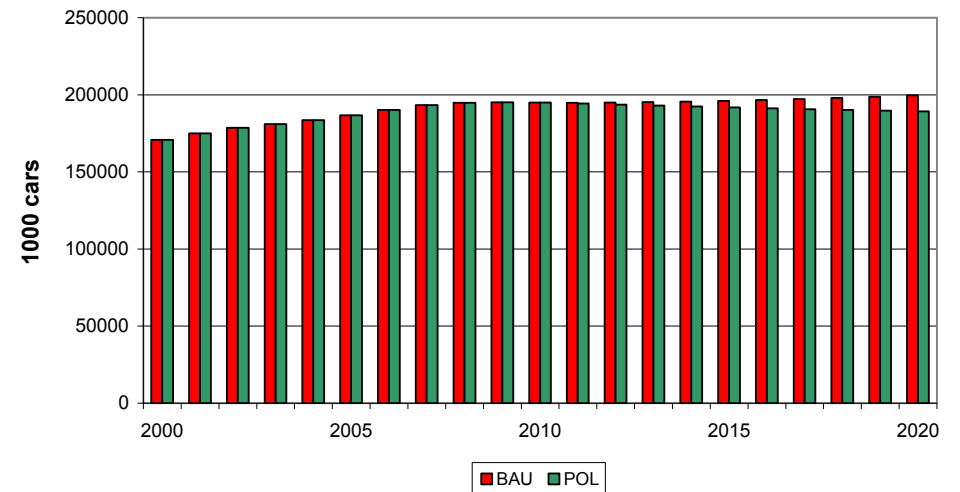
EU-15: Policy scenario: Energy consumption



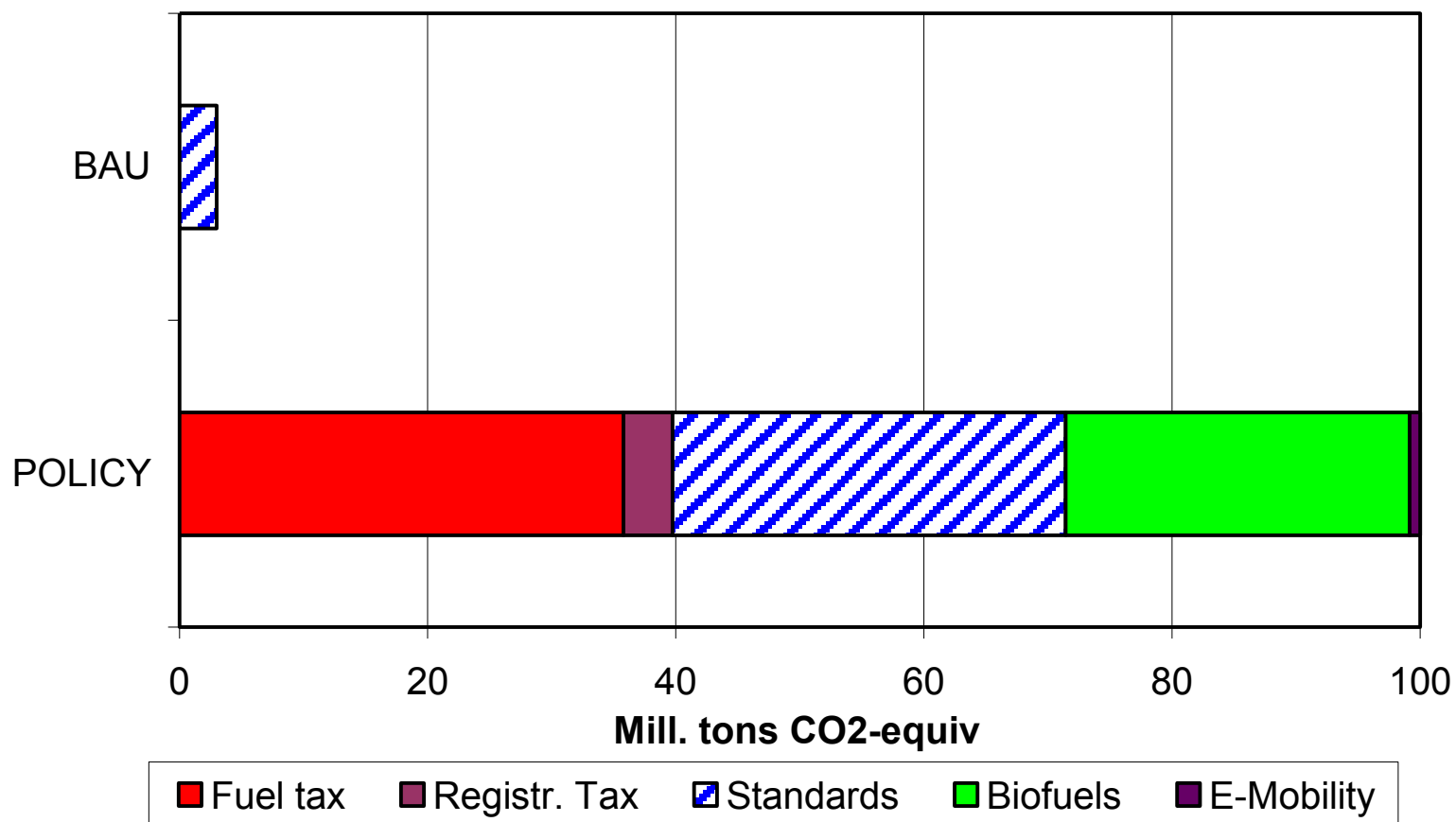
EU-15: ENERGY CONSUMPTION



EU-15: BAU vs Policy scenario: Vehicle stock



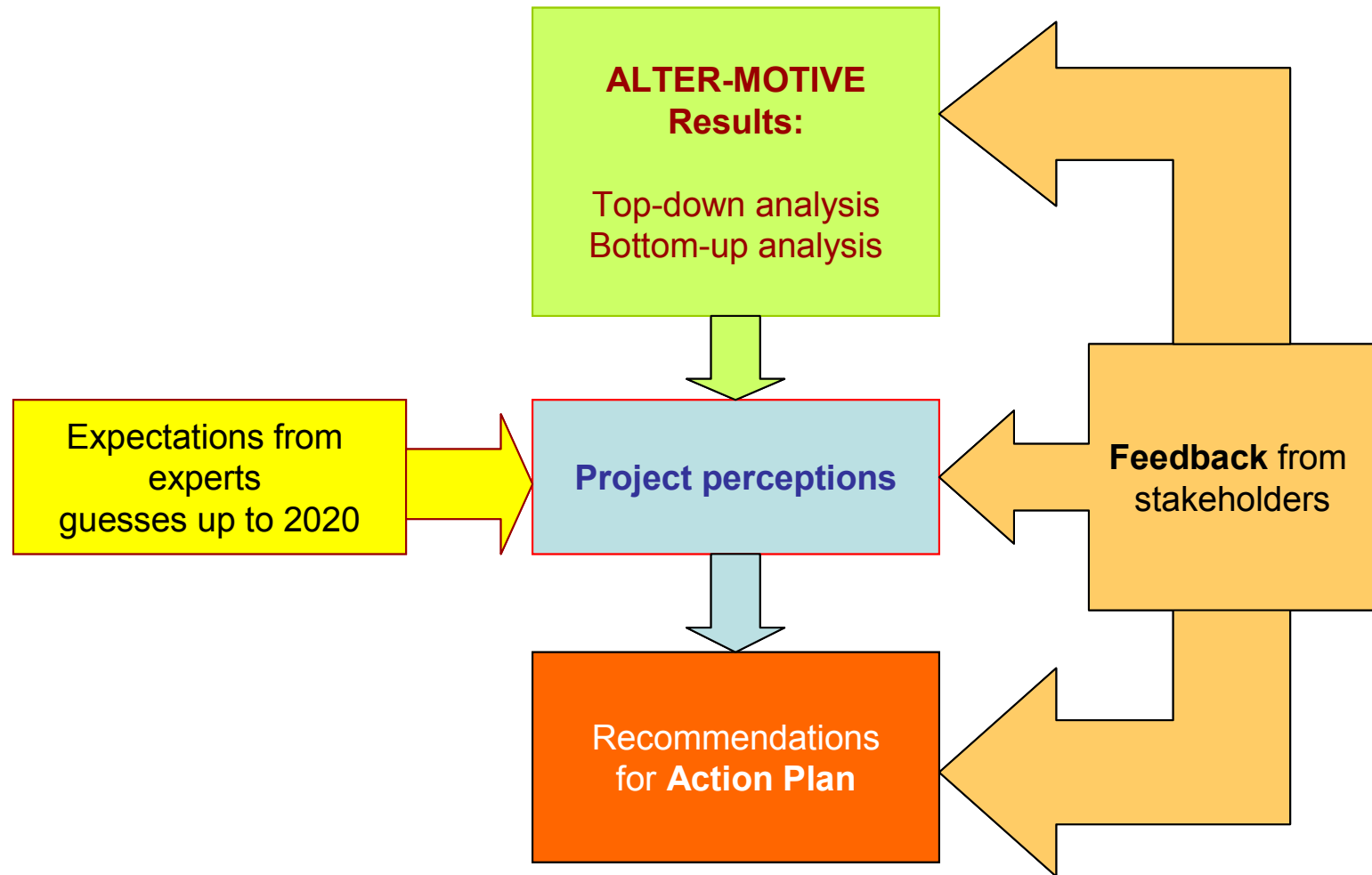
WHICH MEASURES CONTRIBUTE TO CO₂ REDUCTION



Targets of the Action Plan

- Ultimate objective: REDUCE CO₂-EMISSIONS
- WHICH EFFECTS contribute to REDUCE CO₂-EMISSIONS?
 - Reduce
 - Improve
 - Switch
 - Increase public awareness
 - Substitute
- WHICH POLICIES/ACTIONS have an impact on the above-mentioned EFFECTS?

Action plan – method of approach



Priorities of actions today, up to 2020 and beyond

1. Introduce a green bonus scheme for CO₂ reduction in passenger transport

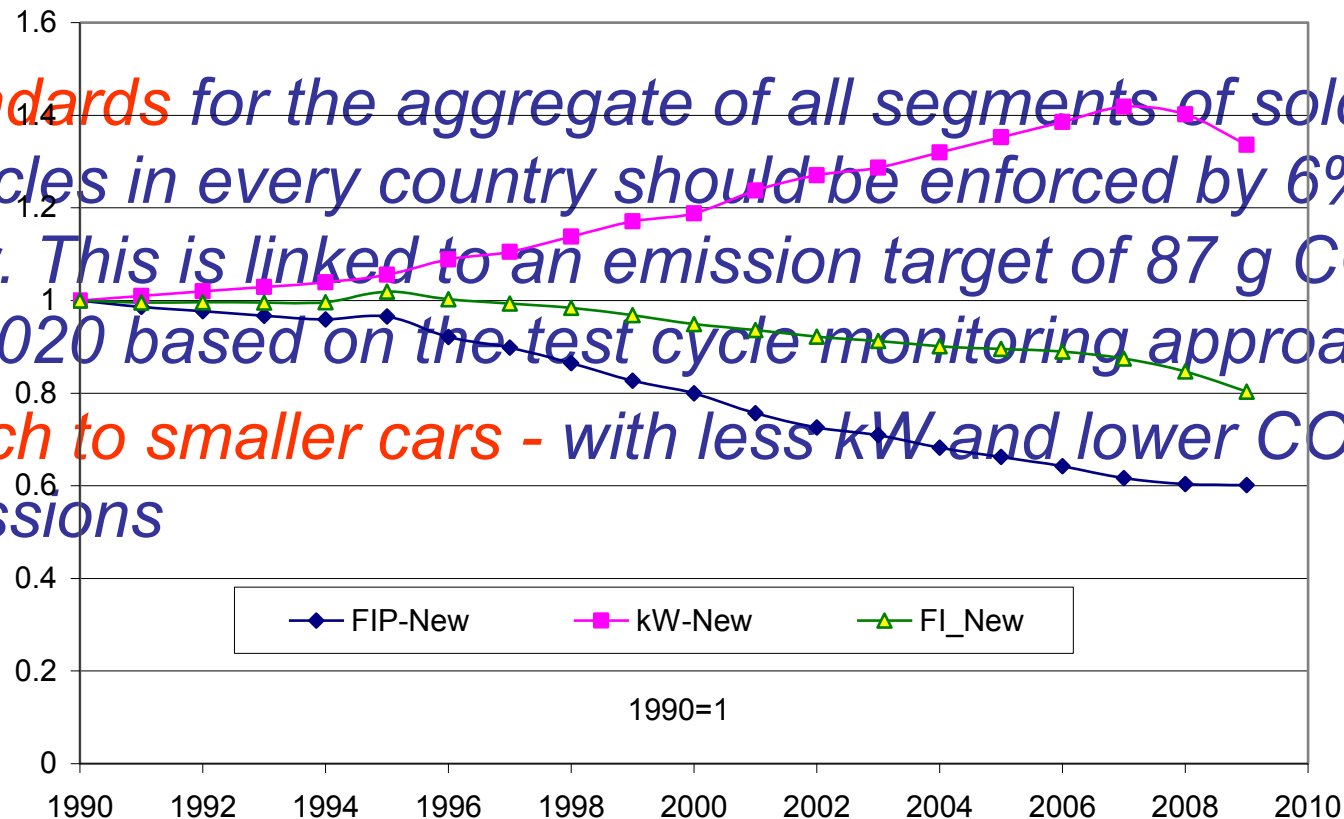
- *monetary incentives* for individuals to change their personal short-term and long-term behaviour
- *green bonus/malus system:*
 - car sharing, turning-in or not owning a car (incl. scrapping scheme), using low-emission highly efficient vehicles, using of public transport
- This system should work like an *annual tax declaration* and can be seen as a forerunner for a personal carbon allowances system.

2. Convert fuel taxes to CO₂ based tax and adapt at a 5% higher level per year

- *Fuel taxes*
- *excise taxes → CO₂ emissions based tax system*
- *Tax revenues:*
 - * *reduce taxes on wages and ensure balanced burden for different social groups;*
 - * *provide incentives for using zero-emission transport modes (walking, biking ...);*
 - * *improve performance of public transport.*

3. New vehicles: tighten requirements to the car manufacturing industry

- **Standards** for the aggregate of all segments of sold vehicles in every country should be enforced by 6% per year. This is linked to an emission target of 87 g CO₂/km by 2020 based on the test cycle monitoring approach.
- **switch to smaller cars** - with less kW and lower CO₂ emissions



Normalised development (1990=1) of fuel intensity, power-specific fuel intensity and power (kW) of new vehicles in EU-15 from 1990 to 2009

4. Implement a size-dependent registration fee for cars and limit depreciation of company cars by size

- A *size-dependent registration fee* for cars would provide a monetary incentive for customers to purchase smaller cars.
- For company cars there should be a clear size-dependent limitation for depreciation to medium-size car costs and taxes.

5. Continue to procure case studies

- 130 *case studies* - We encourage local authorities and initiatives from NGOs strongly to pursue case studies further.

6. Develop infrastructure for “emission free” vehicles

- *BEV and FCV - the potentials for market penetration and CO2 reduction up to 2020 are very limited*
- *the overall ecological performance*
- *Infrastructure for E-mobility:*
It is recommended that the electricity supply industry and municipalities design joint roadmaps for an efficient development of infrastructure.
- *Infrastructure for hydrogen vehicles:*
based on the model region concept for specific areas road-maps considering infrastructure and market introduction of cars should be developed

7. Biofuels first generation: tighten standards – ensure better ecological performance

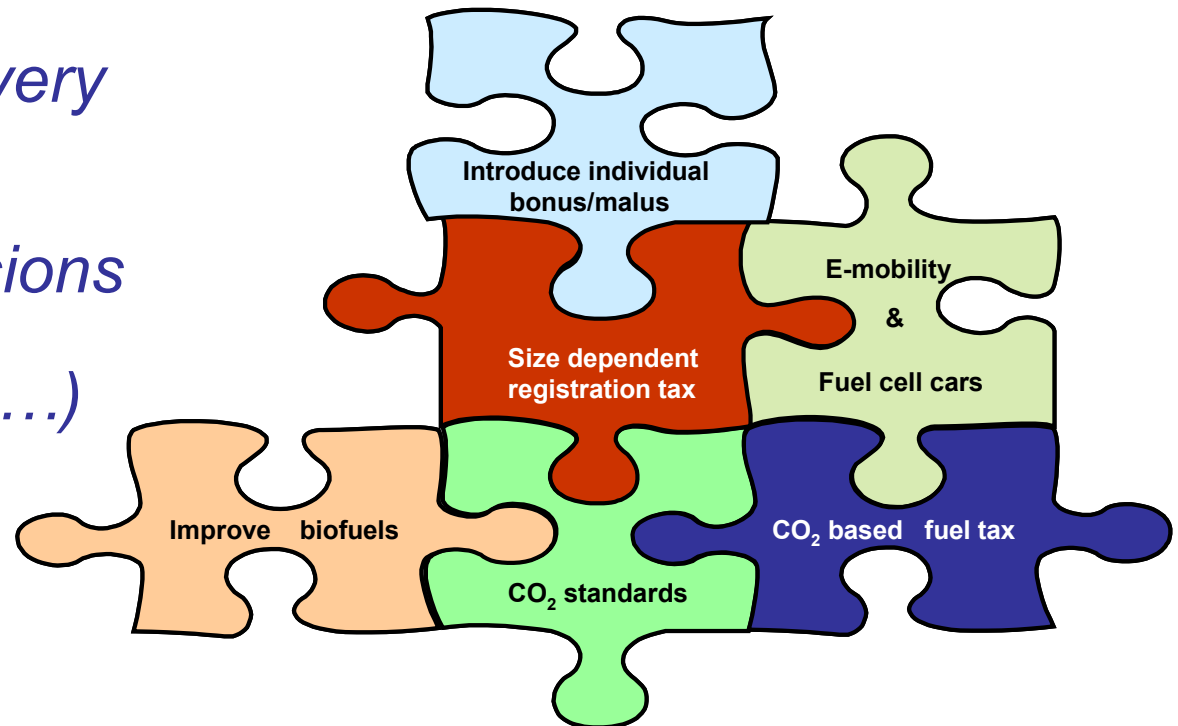
- *ecological and economic performance*
- *An important strategy to cope with these problems is to pursue a strict path towards an improvement of BF-1 to “Renewable fuels” leading to 70% less CO₂ emissions of BF-1 by 2020 compared to about 45% today. This is strongly recommended along with certification and monitoring schemes.*
- *passenger cars might not be the priority target for biofuels*

8. Emphasize efficient R&D for second generation biofuels and hydrogen

- *2nd generation biofuels & hydrogen*
- *R&D (focussing especially on a more efficient conversion of feedstock and primary energy carriers into these alternative fuels)*
- *This should finally also lead to more cost-effective production paths and market competitiveness beyond 2020.*

Conclusions

- standards and taxes
- in the *long-term* only a very *broad portfolio* of policy instruments (taxes, standards, quotas, emissions free-zones...) and new technologies (BEV, FCV ...) can reduce energy consumption and straightforward CO₂ emissions significantly.



Thank you!

www.alter-motive.org