



TECHNOLOGICAL EDUCATION INSTITUTE OF  
CENTRAL MACEDONIA  
SCHOOL OF TECHNOLOGICAL APPLICATIONS  
DEPARTMENT OF MECHANICAL ENGINEERING

**Graduate Studies Program:**  
**Academic Year 2015 - 16**

**"Renewable Energy Systems: Design,  
Development and Optimization"**

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**Subject:**

**Application of a Sustainable Road Transport System in an Urban Area**

**Introduction & Motivation:**

The gradual depletion of fossil fuels and the rise in fuel prices is driving the need for alternative energy carriers for road transport. These energy carriers can be based either on alternative fuels with characteristics similar to conventional fuels to be used in conventional combustion powertrains or on new concepts such as hydrogen technologies and fuel cells, lithium-ion batteries etc. Aim of this thesis is to study the application of such technologies on the road transport system of an urban area and to assess the effects on fuel consumption and emissions on a Life Cycle Analysis basis.

**Implementation & Means:**

The study is going to be based on available literature as well as some modeling of fuel consumption and emissions using activity data for the pilot local road transport system. The assessment will be supported by a Life Cycle Analysis to identify the actual energy and environmental benefit of the studied mix of technologies at regional and country level.

**References:**

- [1] Ronald M. Dell, Patrick T. Moseley, David A.J. Rand, Towards Sustainable Road Transport, Elsevier, 2014
- [2] R. Folkson et al., Alternative Fuels and Advanced Vehicle Technologies for Improved Environmental Performance Towards Zero Carbon Transportation, Woodhead Publishing Series in Energy: Number 57, 2014
- [3] D. Gkatzoflias, C. Kouridis, L. Ntziachristos, Z. Samaras, COPERT 4 Computer programme to calculate emissions from road transport - Users Manual, February 2012, <http://www.emisia.com/copert/Documentation.html>

**Requirements:** *Background and interest in vehicle technologies, internal combustion engines and alternative powertrain concepts, Life Cycle Analysis, spreadsheet calculation software, Matlab.*