

HERA. Highway Energy Assessment

A comprehensive tool for estimating Greenhouse Gas (GHG) emissions and energy consumption of the traffic flows in highways



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Technological Offers type

[Technological solutions](#)

Research and innovation areas

- [Climate, Energy and Mobility](#)
- [Industry, Materials and Circular Economy](#)

ODS



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Where?

[Transport Planning](#) [Transport Research Centre](#)

Keywords: | [energy consumption](#) | [energy efficiency](#) | [transport](#)

Brief description of the technology solution and the added value it provides

TRANSyT –the Transport Research Centre of UPM- has developed HERA, a software tool to estimate the annual energy and carbon footprints of traffic flows for a specific stretch of highway or an entire network.

It also allows calculating energy savings associated to new measures and comparison of scenarios, looking for energy efficiency strategies.

HERA has multiple applications such as environmental impact assessment of road projects: to include GHG emissions impacts and analysis of alternatives from the footprint efficiency point of view; carbon-efficient design of roads for their operational phase: to optimize the footprint of traffic based on the design phase, i.e. alignment, gradient; road operation: to design traffic management strategies which minimize GHG emissions and energy consumption generated by traffic: speed, HDV control, etc.

Description of the technological base

HERA is software dedicated to assess the energy consumption and GHG emissions of roads traffic.

It incorporates two models for different conditions: free flow conditions and toll plazas. In contrast to other modeling approaches, HERA is valid for every country or region and for every road segment or network. It has the possibility of comparing several scenarios or road alternatives. The input data and results could be import or export from geo-references databases.

HERA is of particular interest for assessing alternatives and strategies focused on alignment design, speed adjustment, traffic flow management or fleet composition.

“HERA supports planning and decision-making strategies towards energy efficiency and low-carbon road traffic”

Market demands

Transport

- Kyoto Protocol, energy efficiency plans... Assessment tools are needed to evaluate abatement strategies in road transport seeking to reduce climate change impacts.
- Carbon footprint assessment of the entire life cycle of the road is becoming under regulation in many countries, i.e. in Spain the new Environmental Assessment Law, 2013.

“Improving the alignment of a hilly road could result in 13.7% of annual carbon footprint savings; Speed reduction of light vehicles by 10km/h could save 4.5% of annual carbon footprint of traffic”

Competitive advantages

- Scale- HERA can be applied to any highway network in any location following a segment-by-segment approach.
- Toll plazas – apart from free flow conditions, HERA assess footprint at toll plazas evaluating the energy consumption of different collection systems: manual, electronic toll collection and open road tolling.
- Transport policy measures could be better managed and evaluated with HERA: speed management, fleet renewal, heavy duty vehicles flows, road design (gradient) and toll collection systems.
- HERA produces geo-referenced outputs: annual carbon and energy footprints (CO₂eq/year and MJ/year).
- The system has an interface to link its input/outputs with a GIS, providing geographic representation of the energy consumption and carbon footprint.

“Speed reduction of light vehicles by 10km/h could save 4.5% of annual carbon footprint of traffic”

Previous references

- TRANSyT is a center launched in 2004 by the UPM with the aim to serve as a bridge between UPM and transport authorities, industry and society interested in the subject.
- HERA www.hera.transyt.upm.es

Intellectual property

- Software copyright [M-950112013]

Development stage

- Concept
- R&D
- **Lab-Prototype**
- Industrial Prototype
- Production

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