EVConsult
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The Green Electric Mobility Tool

EVS30, Stuttgart

EVCONSULT
experts in sustainable mobility

Content
The next 15 minutes

- Who are we & what do we do
- Explaining the GEM-tool
- An illustration of the GEM-tool
- A case study
- The way forward

EVConsult
Who are we?

- A team of 15 consultants with various academic backgrounds i.e. environmental, economical, technical, legal & political
- Founded 8 years ago by Roland Steinmetz and Tim van Beek
- Located in the city centre of Amsterdam, The Netherlands
- Strategy consultancy, project management and innovation
- National and international clients
- Innovation and efficiency in EV implementation

Project management

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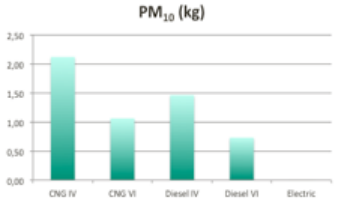
Electric bus knowledge exchange



	$	Rs.	Unit
Diesel IV	0.66	43	liter
Diesel VI*	0.69	45	liter
CNG	0.56	36	kg
Electric	0.13	8	kWh

- Bus fleet Delhi: Calculate impacts of different fuel types on yearly costs per bus technology
- Modelling of environmental
- Five different technologies:
  - CNG IV (reference)
  - Diesel IV
  - Diesel VI
  - CNG VI
  - Electric

Innovation

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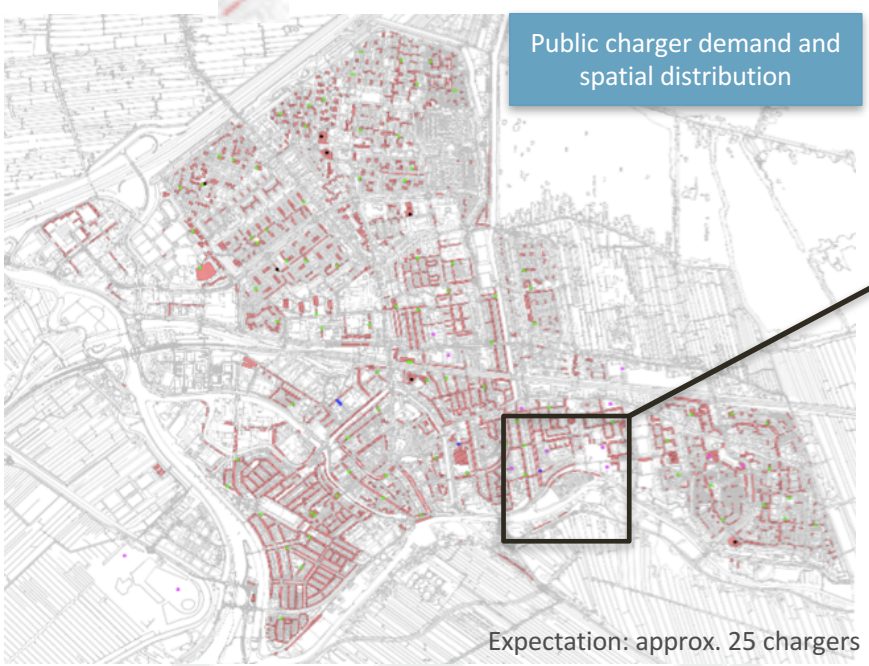
Strategic mapping EV chargers

ublic charger (2p)



Consultancy

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EV Policy and implementation

- Study on the introduction of electric mobility in Bhutan as part of an international team at the World Bank
- Creating an EV roadmap for Bhutan 2020 including charging infrastructure, target groups, policy measurements & fiscal incentives
- Apply EV expertise in local context

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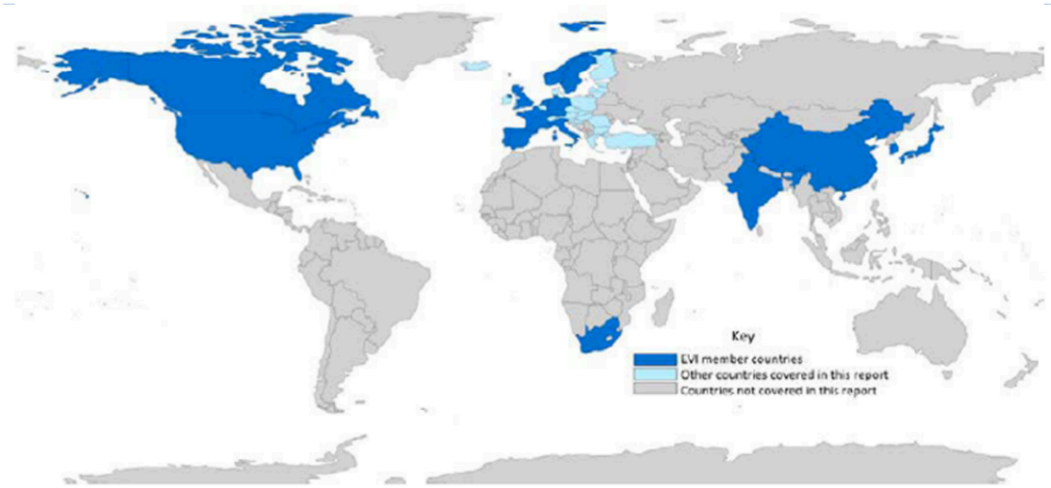
Global EV development

- Electric vehicles (EV)
  - Mobility is essential for social and economic well being
  - Adverse side effects mobility especially felt in developing countries
  - Middle Income Countries 5 out of 7 billion people
  - Urban areas legitimacy for EV uptake
  - Learn from frontrunner EV countries



EV Global Outlook 2016 – covering 98% of the global electric car stock

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Approach

Quick scan:

- Overview (and evaluation) of the local system beforehand
- Mapping of the essential aspects necessary for the introduction of EV
- Identifying barriers and opportunities
- Identifying the influential actors, institutions, networks and infrastructure

Benefits:

- A practical assessment tool based on extensive research
- Make use of the existing local system
- Increase the chance of EV to become embedded in the local context
- Avoid making beginner mistakes

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Steps

- *Step 1: input for the questionnaire*
  - Brief background sketch

- *Step 2: online GEM-Tool*
  - Online questionnaire http://evconsult.nl/gem-tool/
  - 49 preconditions and 7 overarching activities

- *Step 3: outcome of the GEM-tool (PDF file)*
  - Score of the preconditions, overarching activities and the entire local context
  - Policy implications & recommendations based on the scores
  - Overview & evaluation of the local system

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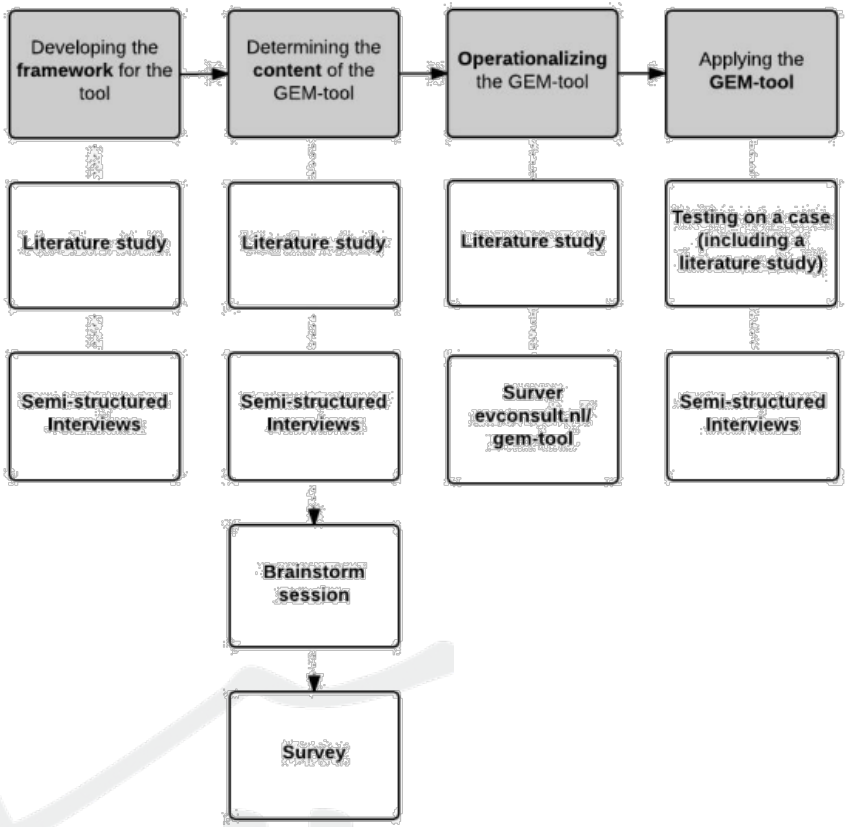
Methodology

- Literature study of 33 reports on eMobility combined with 29 articles on theory of Technical Innovation System (TIS-) approach
- 8 Semi-structured interviews
- Survey with 21 experts
- Case study



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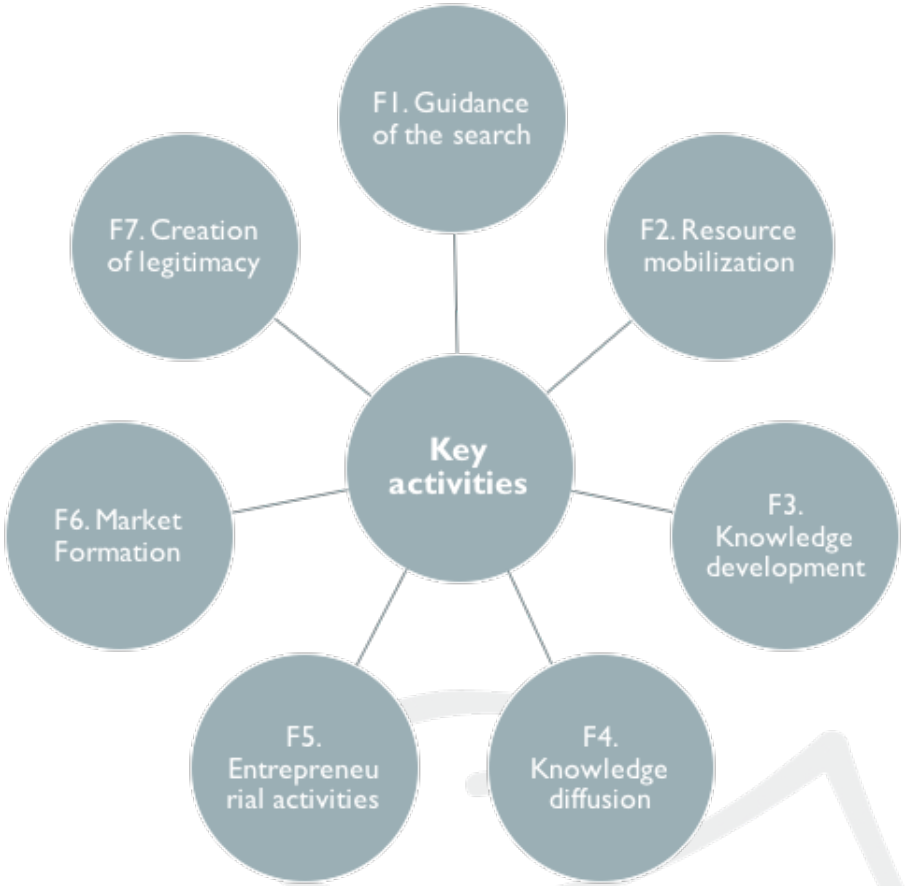
System functions (TIS)



System function	Description
F1 Guidance of the search	Those activities that shape the needs, requirements and expectations of actors with respect to their support of the emerging technology
F2 Resource mobilization	The allocation of human, financial and material capital used for the technology to develop and diffuse
F3 Knowledge development	The learning mechanisms which are the heart of an innovation process, including learning by doing and learning by searching
F4 Knowledge diffusion & networks	The facilitation of knowledge between all actors involved, including learning by using and learning by interacting
F5 Entrepreneurial activities	The translation of knowledge into actions and business opportunities
F6 Market formation	The creation of a demand and supply for the new technology
F7 Creation of legitimacy	The creation of legitimacy for an innovation through advocacy coalitions

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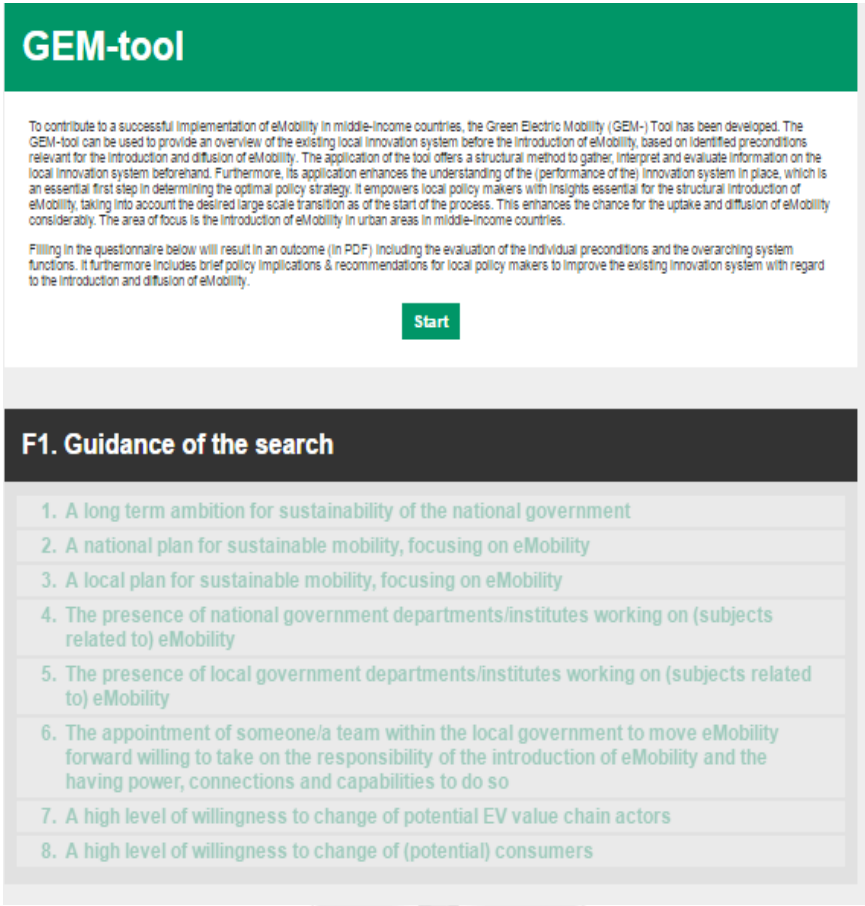
An illustration



- The online GEM-tool showing:
  - General explanation
  - ‘Guidance of the search’ as one of the overarching activity and its 8 corresponding preconditions

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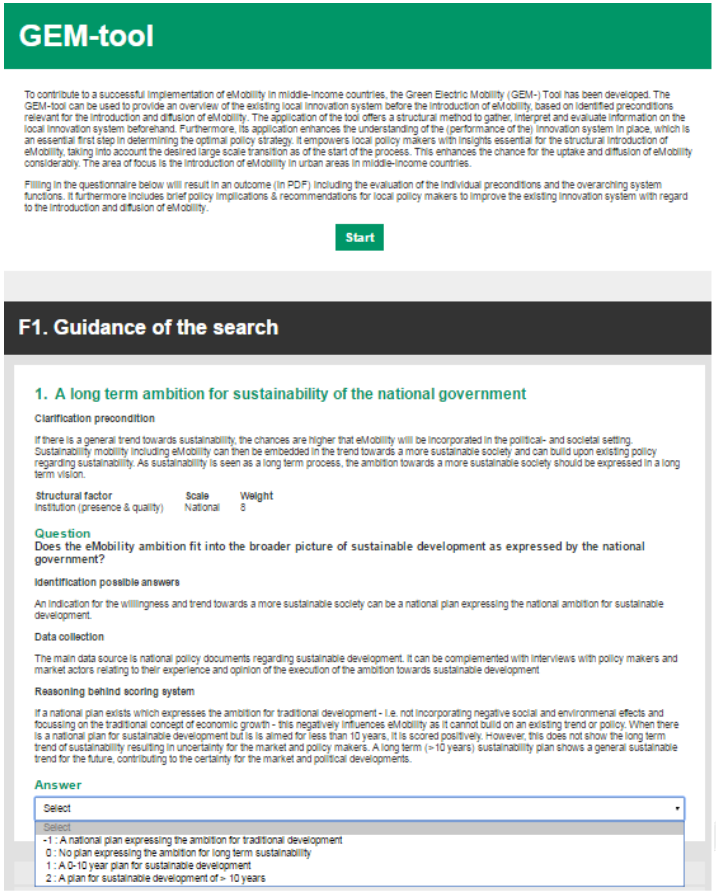
An illustration



GEM-tool

To contribute to a successful implementation of eMobility in middle-income countries, the Green Electric Mobility (GEM-) Tool has been developed. The GEM-tool can be used to provide an overview of the existing local innovation system before the introduction of eMobility, based on identified preconditions relevant for the introduction and diffusion of eMobility. The application of the tool offers a structural method to gather, interpret and evaluate information on the local innovation system beforehand. Furthermore, its application enhances the understanding of the (performance of the) innovation system in place, which is an essential first step in determining the optimal policy strategy. It empowers local policy makers with insights essential for the structural introduction of eMobility, taking into account the desired large scale transition as of the start of the process. This enhances the chance for the uptake and diffusion of eMobility considerably. The area of focus is the introduction of eMobility in urban areas in middle-income countries.

Filling in the questionnaire below will result in an outcome (in PDF) including the evaluation of the individual preconditions and the overarching system functions. It furthermore includes brief policy implications & recommendations for local policy makers to improve the existing innovation system with regard to the introduction and diffusion of eMobility.

Start

F1. Guidance of the search

1. A long term ambition for sustainability of the national government

Clarification precondition

If there is a general trend towards sustainability, the chances are higher that eMobility will be incorporated in the political- and societal setting. Sustainability mobility including eMobility can then be embedded in the trend towards a more sustainable society and can build upon existing policy regarding sustainability. As sustainability is seen as a long term process, the ambition towards a more sustainable society should be expressed in a long term vision.

Structural factor	Scale	Weight
Institution (presence & quality)	National	8

Question
Does the eMobility ambition fit into the broader picture of sustainable development as expressed by the national government?

Identification possible answers

An indication for the willingness and trend towards a more sustainable society can be a national plan expressing the national ambition for sustainable development.

Data collection

The main data source is national policy documents regarding sustainable development. It can be complemented with interviews with policy makers and market actors relating to their experience and opinion of the execution of the ambition towards sustainable development

Reasoning behind scoring system

If a national plan exists which expresses the ambition for traditional development - i.e. not incorporating negative social and environmental effects and focussing on the traditional concept of economic growth - this negatively influences eMobility as it cannot build on an existing trend or policy. When there is a national plan for sustainable development but is is aimed for less than 10 years, it is scored positively. However, this does not show the long term trend of sustainability resulting in uncertainty for the market and policy makers. A long term (>10 years) sustainability plan shows a general sustainable trend for the future, contributing to the certainty for the market and political developments.

Answer

Select

Select
-1 : A national plan expressing the ambition for traditional development
0 : No plan expressing the ambition for long term sustainability
1 : A 0-10 year plan for sustainable development
2 : A plan for sustainable development of > 10 years

- Zooming in on F1 Guidance of the search
- Its first precondition with its corresponding elements:
  - *Clarification of the precondition*
  - *Specification of the scale*
  - *A certain weight within the overarching activity*
  - *Data collection possibilities*
  - *Explanation scoring system*
  - *4 possible answers and scores*

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Function 2: Resources

F2. Resource mobilization (financial, human & material)

9. The presence of international funding which can be deployed in the local context
10. The presence of national financial resources for the development and diffusion of eMobility
11. The possibility of a loan for eMobility
12. A high level of awareness amongst potential EV value chain actors about the potential financial resources (if present)
13. Insight in the different modes of transport used in the urban region
14. The availability of suitable electric vehicles and charging points
15. The availability of complementary technology
16. **The presence of consistent energy supply (strength and stability of the grid) needed for eMobility**
17. The presence of renewable sources for the energy supply needed for eMobility
18. A supporting geographical and climatological environment for eMobility
19. The presence of experts with knowledge, capabilities and skills relating to eMobility

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Function 6: Market formation

F6. Market formation

39. A competing fuel price for eMobility compared to (local) traditional vehicles
40. A competitive cost structure of EVs compared to (local) traditional vehicles (focus on purchasing price)
41. Presence of subsidies which could positively influence the introduction of eMobility
42. Presence of taxes which could influence the introduction of eMobility
43. Regulation/legislation positively influencing the introduction of eMobility regarding transportation & mobility and the automotive sector
44. Regulation/legislation positively influencing the introduction of eMobility regarding import
45. Regulation/legislation positively influencing the introduction of eMobility regarding electricity

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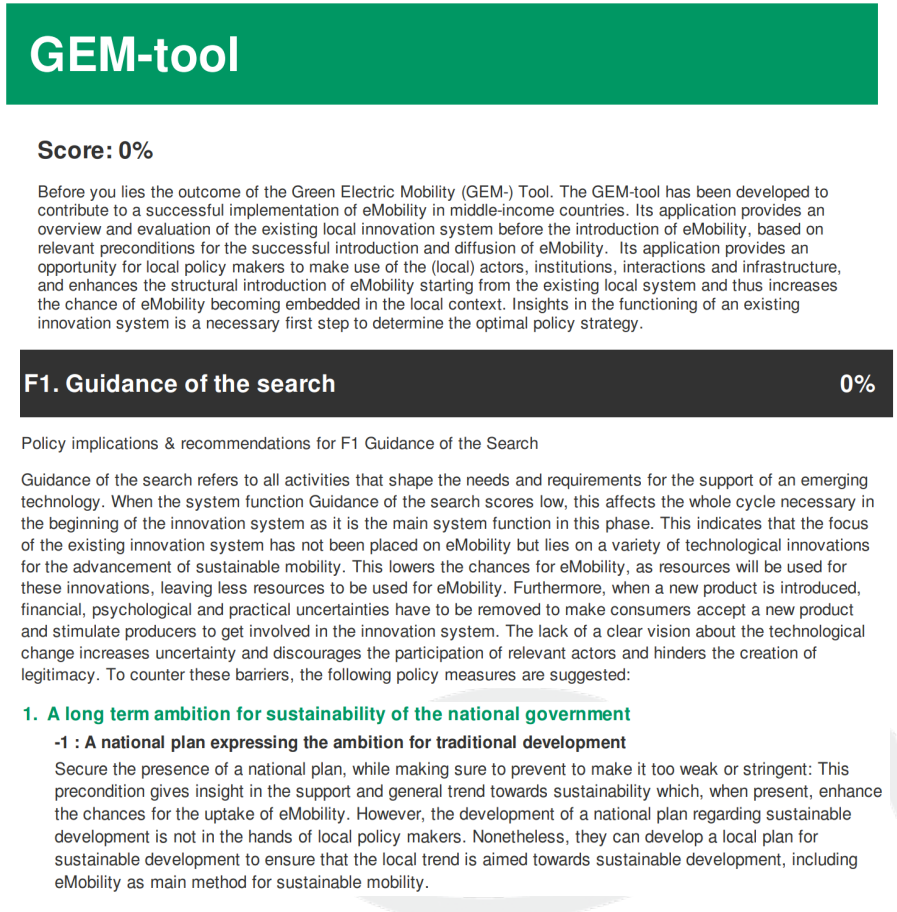
Output



GEM-tool

Score: 0%

Before you lies the outcome of the Green Electric Mobility (GEM-) Tool. The GEM-tool has been developed to contribute to a successful implementation of eMobility in middle-income countries. Its application provides an overview and evaluation of the existing local innovation system before the introduction of eMobility, based on relevant preconditions for the successful introduction and diffusion of eMobility. Its application provides an opportunity for local policy makers to make use of the (local) actors, institutions, interactions and infrastructure, and enhances the structural introduction of eMobility starting from the existing local system and thus increases the chance of eMobility becoming embedded in the local context. Insights in the functioning of an existing innovation system is a necessary first step to determine the optimal policy strategy.

F1. Guidance of the search **0%**

Policy implications & recommendations for F1 Guidance of the Search

Guidance of the search refers to all activities that shape the needs and requirements for the support of an emerging technology. When the system function Guidance of the search scores low, this affects the whole cycle necessary in the beginning of the innovation system as it is the main system function in this phase. This indicates that the focus of the existing innovation system has not been placed on eMobility but lies on a variety of technological innovations for the advancement of sustainable mobility. This lowers the chances for eMobility, as resources will be used for these innovations, leaving less resources to be used for eMobility. Furthermore, when a new product is introduced, financial, psychological and practical uncertainties have to be removed to make consumers accept a new product and stimulate producers to get involved in the innovation system. The lack of a clear vision about the technological change increases uncertainty and discourages the participation of relevant actors and hinders the creation of legitimacy. To counter these barriers, the following policy measures are suggested:

1. **A long term ambition for sustainability of the national government**

   -1 : A national plan expressing the ambition for traditional development

   Secure the presence of a national plan, while making sure to prevent to make it too weak or stringent: This precondition gives insight in the support and general trend towards sustainability which, when present, enhance the chances for the uptake of eMobility. However, the development of a national plan regarding sustainable development is not in the hands of local policy makers. Nonetheless, they can develop a local plan for sustainable development to ensure that the local trend is aimed towards sustainable development, including eMobility as main method for sustainable mobility.

- Outcome of the GEM-tool
- Overall score of the tool and a general explanation

  < 33% = a weak function/system

  33-66% = an intermediate function/system

  > 66% = a strong function/system

- Score per overarching activity with brief policy implications and recommendations
- Scores of the individual precondition with explanation

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A case study

- Applied to Delhi (India)

- Outcome:
  - Intermediate innovation system
  - India as a whole positive trend, Delhi lags behind
  - More cooperation and learning necessary

- Learnings:
  - Practical and structural data collection
  - Usefulness of chosen preconditions
  - Identifies barriers & opportunities

Overall score	65%
Guidance of the Search	79%
Resource Mobilization	68%
Knowledge Development	75%
Knowledge Diffusion & Networks	49%
Entrepreneurial Activities	68%
Market Formation	65%
Creation of Legitimacy	43%

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The way forward

- A structural method to gather, interpret and evaluate information
- Starting point for EV policy in urban areas in MICs
- First blueprint of a practical assessment tool

- What's next?
  - Improvement of the GEM-tool
  - Theoretical foundation has been made, now learning by doing
  - GEM-tool as platform: http://evconsult.nl/gem-tool/

- *Who takes up the challenge?*

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Back-up slides

Key elements in EV program

1. Infrastructure

2. Vehicles

3. Incentives

4. Awareness

5. Sharing knowledge

Country categorization

types

Fossil fuel producing countries	Hydro-power producing countries	Net-importing energy countries
• Case study Kazakhstan • Fossil Fuels: 87.3% Hydroelectric: 12.7% Renewables: 0.6% Nuclear: 0%	• Case study Kyrgyzstan • Fossil Fuels: 21.1% Hydroelectric: 78.9%	• Case study Pakistan • Fossil Fuels: 67.1% Hydroelectric: 29.2% Renewables: 0.4% Nuclear: 3.2%