Driving forces for electrification of traffic

- Growth of population
- Strong economical development in Asia
- Urbanization, mega cities
- Battle against climate change: reduction of CHG-emissions
- Air quality improvement
- Energy security: decreasing the oil dependency; renewable energy
Technology development needed

- Electric energy storage:
  - capacity, life-time, reliability, safety,…

- Motors and drives:
  - energy efficiency, size and weight, withstanding the operational conditions in vehicles,

- Control systems:
  - battery management, power train, ESP,…

- Vehicle technology:
  - new possibilities and requirements

- Light structures and new materials
Infrastructure and services: new challenges and opportunities

- Electric grids
  - Capacity and stability of grids
  - Smart grids needed if plug-in vehicles dominate

- Charging infrastructure
  - Slow, fast and ultra-fast charging
  - Different technologies: cord, inductive, …

- Services
  - Smart traffic and navigation
  - Car sharing, battery/vehicle leasing
  - New skills for maintenance and emergency personnel
User perspective

- **Consumer products**
  - Acceptability: performance, usability, reliability
  - Desirability: exciting, fun, modern, clean
  - Economy: price, total cost of ownership
User perspective

- **Commercial vehicles**
  - Performance-in-use, operability, reliability
  - Convergence to process, effect on company image
  - Productivity, life-cycle economy
EVE (Electric Vehicle Systems) - Programme in Finland

- 5-year Tekes-programme focusing on creating new business around electric vehicles and systems related to them

- Long term goal is to increase the amount of business related to electric vehicles 10-fold by 2020 in Finland

- Testing environments for electric vehicles

- Strategic partnerships to international actors who are interested in Finnish electric vehicle know-how
Future development

Electric vehicles can help to solve and to decrease problems:
  • Not all the problems

Utilization of electric vehicle, especially electric cars is a system change
  • Electric cars cannot just be taken in use
  • Many other changes and new innovations are needed
  • Big business risks and huge business opportunities
Play making factors

- Incentives and regulations
- Price development (batteries, oil)
- Performance (operational range, reliability in all conditions)
- Development of efficiency, economy and emission control of internal combustion engines
- Fuel cell technology development
Future scenarios

- Over 45 million electric 2-wheelers and 4-wheelers will be sold annually in 2025 (Frost&Sullivan)?

- Total cost of ownership between an electric car and a gasoline car will be equal in 2020?

- EV hype?

- One technical solution is not suitable for all cases

- Combination of different technologies:
  - BEVs, PHEVs, FCHEVs
  - Biofuels/renewable fuels + combustion engines