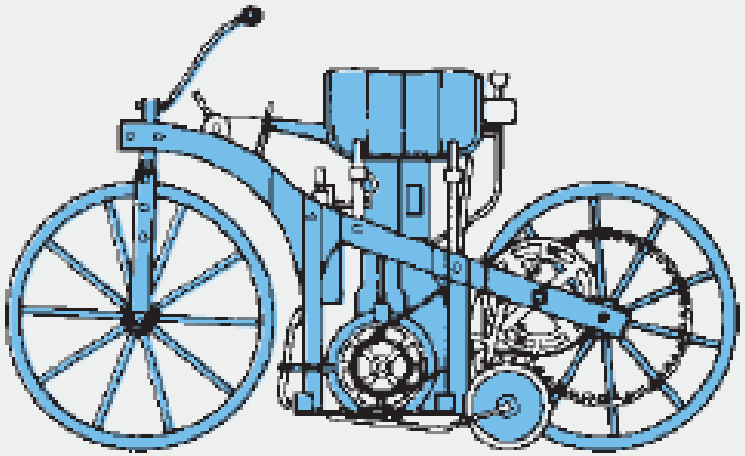
Challenges of Education for E-Vehicles Era

WELCOME

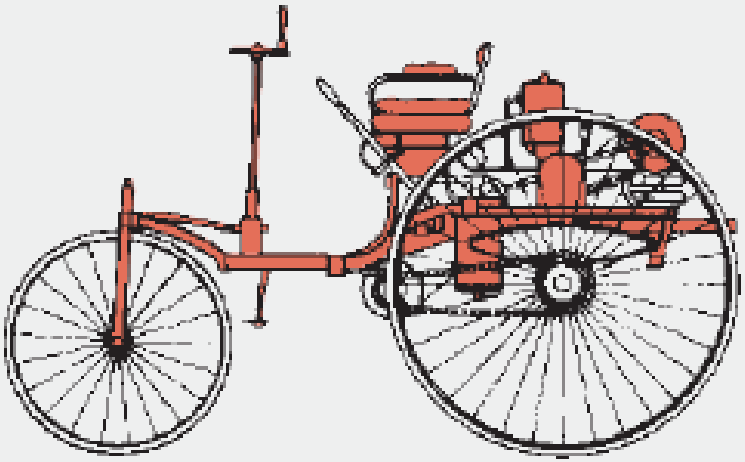
Milan Kjosevski
Professor of Automotive Engineering

A BIT OF HISTORY

How everything started?



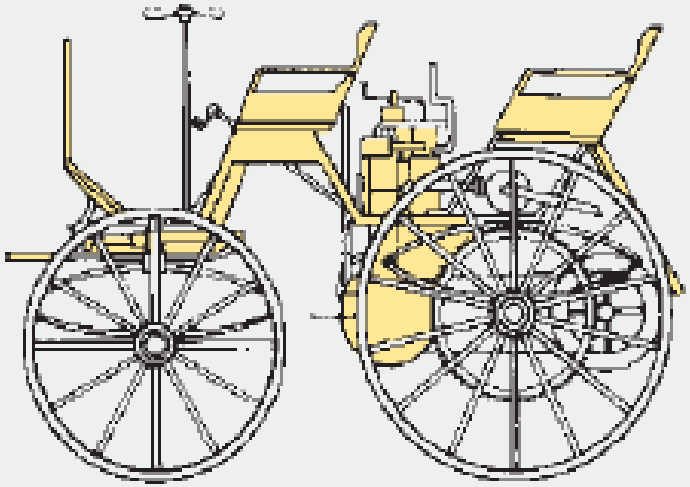
Daimler motorcycle, 1885
1 cylinder, bore 58 mm
Stroke 100 mm, 0.26 l
0.37 kW at 600 rpm, 12 km/h



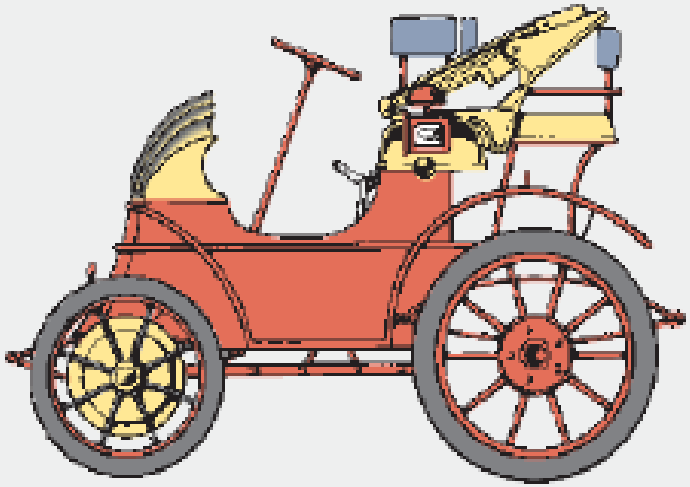
Benz patent motor carriage, 1886
1 cylinder, bore 91.4 mm
Stroke 150 mm, 0.99 l
0.66 kW at 400 rpm, 15 km/h

A BIT OF HISTORY

First Electromobile?

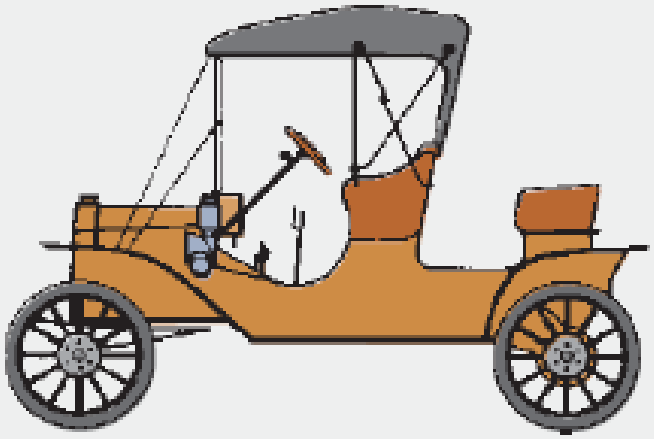


Daimler motor carriage, 1886
1 cylinder, bore 70 mm
Stroke 120 mm, 0.46 l
0.8 kW at 600 rpm, 18 km/h

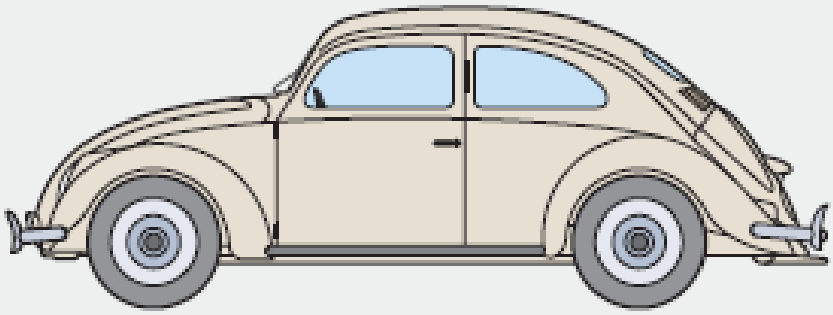


Electromobile, 1897
Lohner-Porsche system
Transmission-free drive with
wheel-hub electric motor

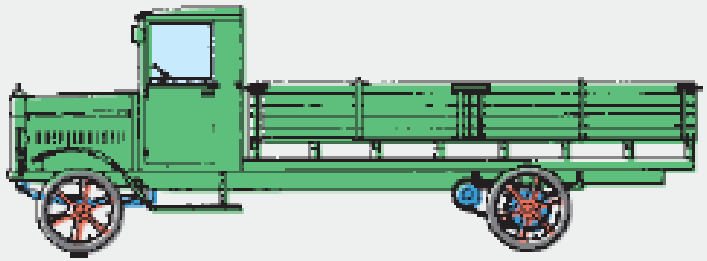
How it continued...



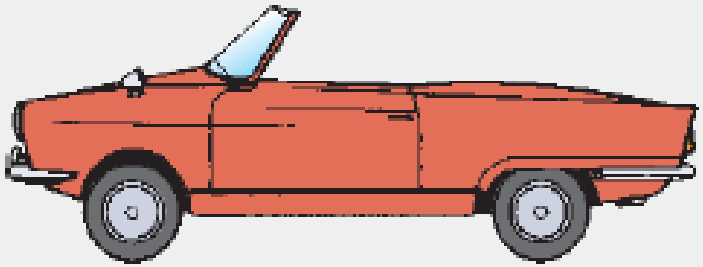
Ford Model T, 1908
2.9 l, 15.7 kW at
1,600 rpm, 70 km/h



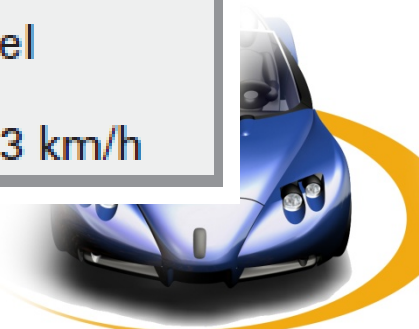
VW Beetle, 1938
985 cc, 17.3 kW at
3,000 rpm, 100 km/h



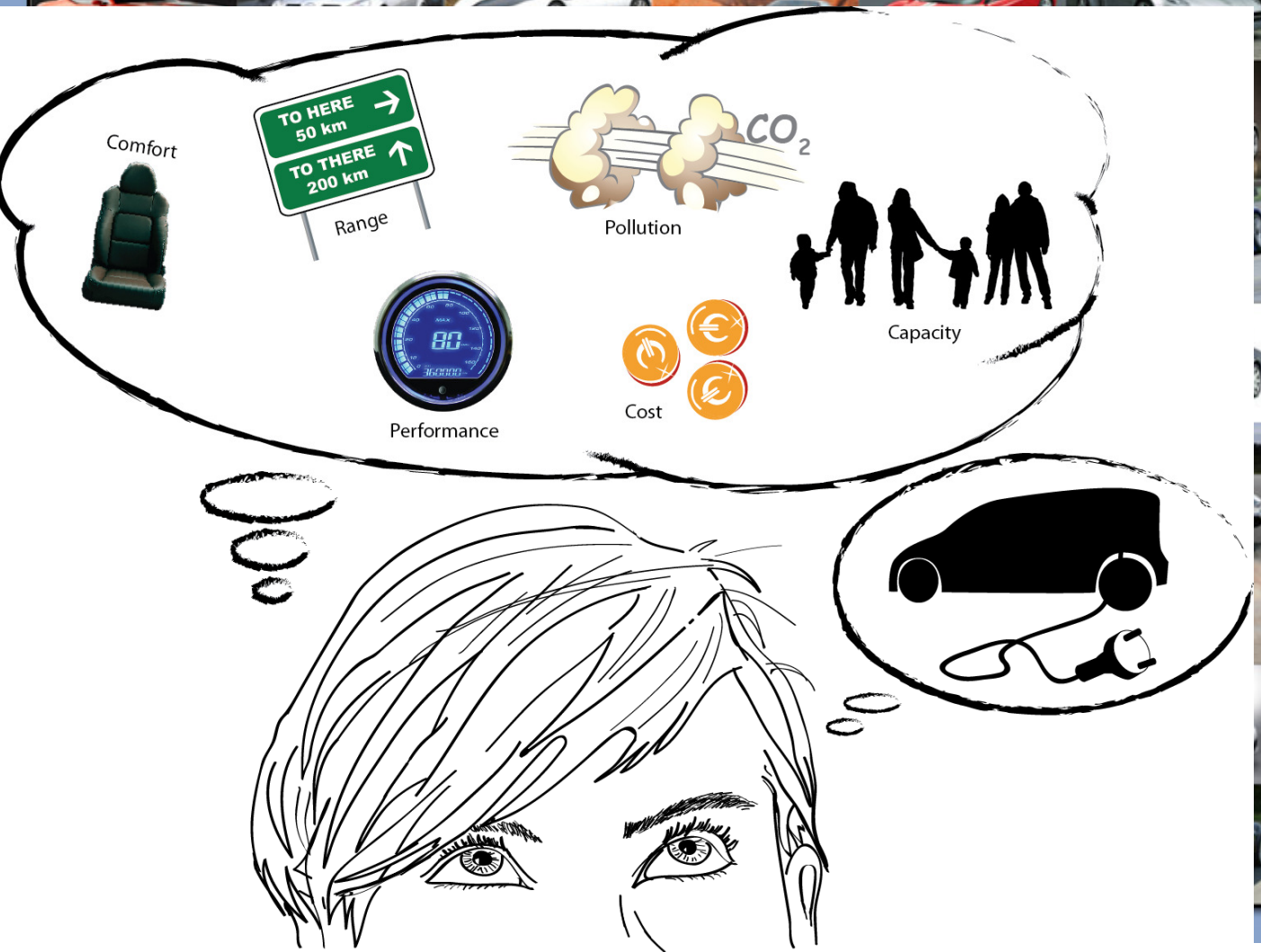
Benz-MAN lorry, 5 K 3
1st diesel lorry, 1923



NSU Spider with Wankel
engine, 1963, 500 cc,
37 kW at 6,000 rpm, 153 km/h



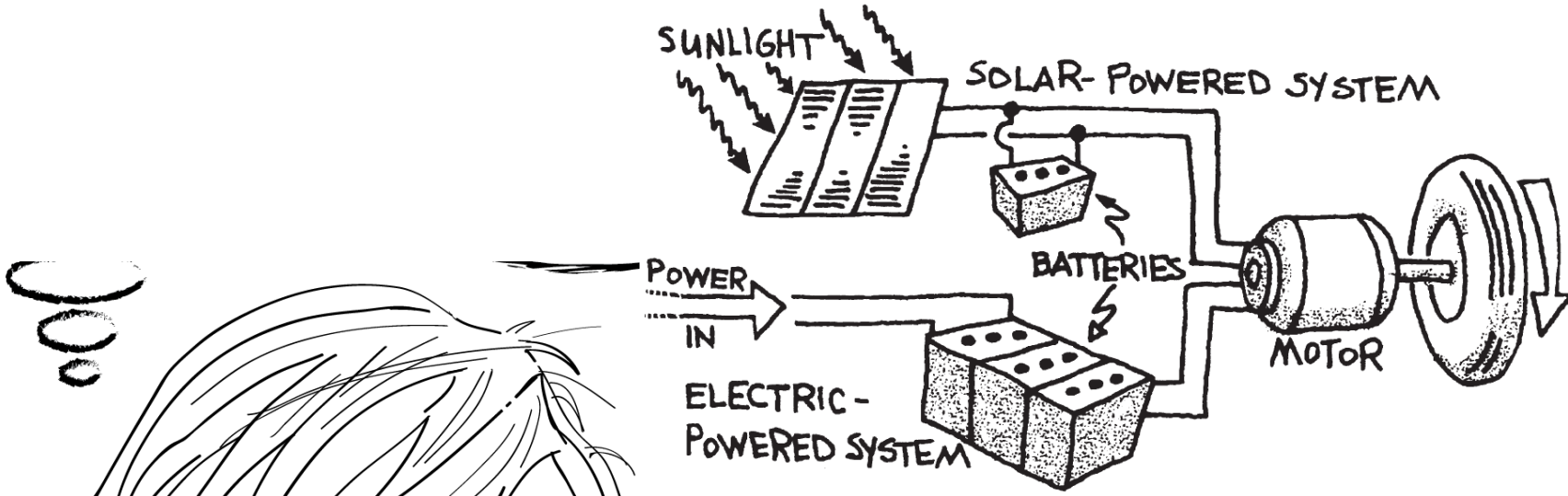
Where we are?


Comfort
TO HERE
50 km
TO THERE
200 km
Range
CO_2
Pollution
Capacity
Performance
Cost

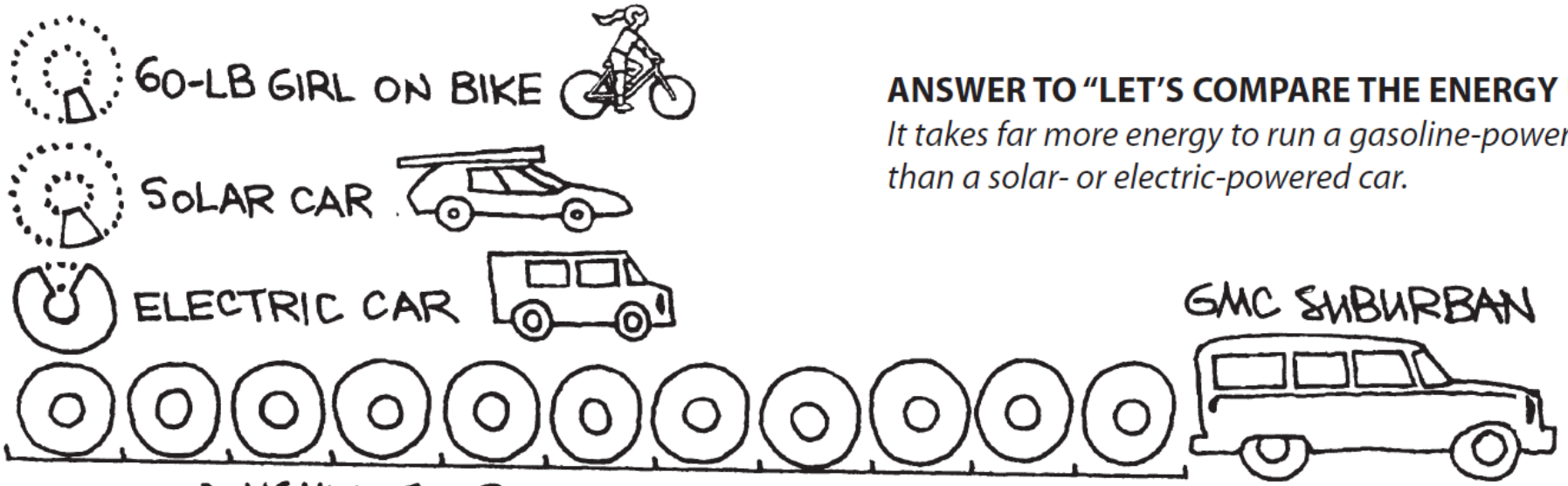
Where to go?

esa Education

Nuna II



Is it time to be rational and green?



ANSWER TO "LET'S COMPARE THE ENERGY USED"

It takes far more energy to run a gasoline-powered car than a solar- or electric-powered car.

Some people try to avoid repeating errors ...

The future of travel: Transportation confronts its 'Kodak moment'

AT&T Foundry in Palo Alto, May 14, 2013 (By Andrew Keen, for CNN)

Inaugural FutureCast event in Palo Alto.
50 innovative entrepreneurs, executives, policy makers and writers were invited to discuss how online technology is transforming transportation (executives from General Motors, Tesla, Sidecar, American Airlines and the San Francisco Municipal Transportation Agency and others).

The goal:
To rethink travel in today's networked society and re-imagine the car, bus and train in the digital age.

'Kodak moment' - photography company Kodak was catastrophically blindsided by the digital revolution in photography.
This moment is every traditional CEO's worst nightmare.

… and conclude…

The future of travel: Transportation confronts its 'Kodak moment'
AT&T Foundry in Palo Alto, May 14, 2013 (By Andrew Keen, for CNN)

HIGHLIGHTS

The current set of technologies are reaching a natural limit.

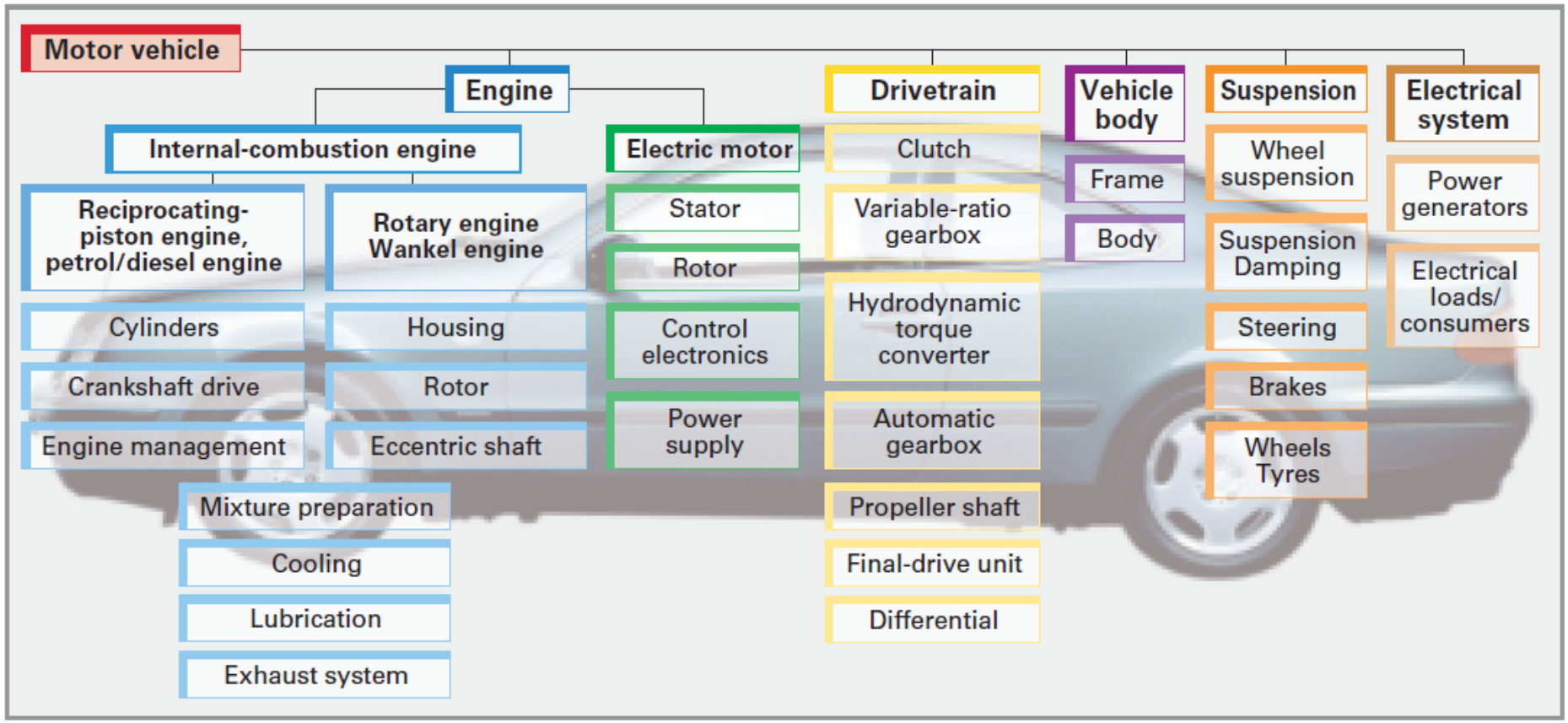
Transportation is set to be transformed by digital technology. Industry needs to avoid being blindsided by rise in digital tech.

Time is right for more development of self-driving cars.

Let's we think, as well…

Question:

What types of Engineers might play a role in designing and producing a new (electric) automobile?



Careers in Electric Vehicles

James Hamilton

September 2011 — Report 4

Conclusion

Electric vehicles are an important component of the growing green economy because they can reduce pollutants and dependence on fossil fuels.

Jobs in the electric vehicles industry show great potential for new employment opportunities, and employment is expected to grow in all of the major sectors of the industry.

In addition, jobs will be created as the electric infrastructure is expanded to support these vehicles.

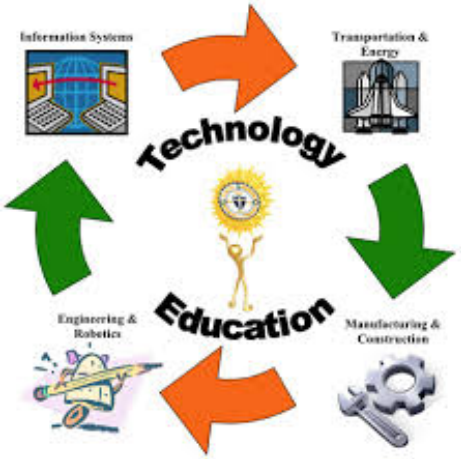
These new jobs will cover a wide variety of occupations.

Careers in Electric Vehicles

Electric vehicle occupations

Occupations in scientific research

Occupations in design and development



Chemical engineers
Electrical engineers
Electronics engineers
Industrial engineers
Materials engineers
Mechanical engineers
Mechanical engineering technicians
Mechanical drafters
Commercial and industrial designers

Occupations in electric vehicle maintenance

Occupations in sales and support

And also, others …

Automotive Technology: Greener Jobs, Changing Skills

EDUCATIONAL NEEDS REPORT

Research conducted by the Center for Automotive Research

Education aimed at people training for careers in the automotive industry suffers from a stigma.

The popular perception of the industry is that it is a relic of the past that is lacking in innovation or good career opportunities.

Green technologies bring the promise of revitalizing the industry, however, and courses in advanced powertrains, electronics, alternative fuel and battery technologies are big draws at universities.

Student demand for courses focusing on emerging technologies is growing faster than schools can expand programs.

How some react …

RIT Rochester Institute of Technolodgy – New York

AUTOMOTIVE ENGINEERING OPTION

Ellectivities + 2-semester multi-disciplinary design project in advanced automotive.

Ellectivities:

Internal Combustion Engines
High Performance Vehicle Engineering
Powertrain Systems and Design
Vehicle Dynamics
Design of Machine Systems
Applications of Finite Element Analysis
Advanced Solid Modelling and Design
Robotics
Fuel Cell Technology
Classical Control Systems
Introduction to Optimal Design
Introduction to Engineering Vibrations

MECHANICAL ENGINEERING DUAL DEGREE PROGRAMS

… and how some others react …

Illinois Institute of Technology

PROJECT COURSE

IIT's IPRO course provides a student team format for organizing an ongoing series of progressive, cumulative project experiences that advance both the learning and research associated with advanced automotive power systems.

This multidisciplinary experiential approach is based on IIT's two-semester undergraduate general education requirement that accommodates students from all disciplines and professional programs, and students from the sophomore level through graduate school, as part of a team.

Through successive semester-long IPRO team experiences, students become familiar with the role of electrical systems in advanced automotive power platforms, and they use simulations, actual conversions, and experimentation to investigate their potentials and limitations.

… and how some others react …

Technische Universiteit
Eindhoven
University of Technology

1.2 Major in Automotive

1.2.1. Definition

Automotive is a field that fully complements the technological and societal challenges facing the automotive industry.

Future developments in the industry will be geared to:

- **Smart mobility: how can smart automotive technology help reduce the number of traffic jams?**

- **Clean vehicles: how can new methods make the car even more fuel-efficient and clean?**

Is this the right example?

Technische Universiteit
Eindhoven
University of Technology

Automotive field concerns the following sub-fields and subjects:

- **Thinking in terms of systems**
- **Area of mobility, energy supplies and the environment**
- **Vehicle communication**
- **Reduction of traffic jams**
- **Cooperative mobility**
- **Vehicle efficiency**
- **Electric vehicles**
- **Platform electrification**
- **Vehicle optimization**

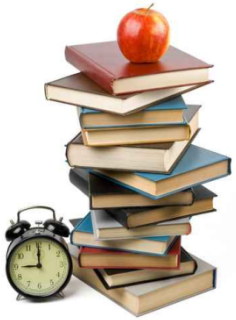
What is up to us?

Being proactive

Promote technology

Work on public awareness

Adopt curricula



Do research

Motivate students

Avoid blindness

Introduce LLL courses

Cooperate with everyone in the stream

Partners in Education

Back to the nature…

LIGHTHTNING

Are the students clairvoyant?

LIGHTHTNING

Macedonian

МОЛЊА

Ancient slavic

ВЕДА

I WISH YOU A GREAT SUCCESS

(thank you for your attention)