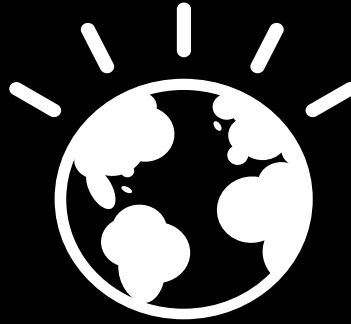# Electric vehicles: how to deliver on the promise

Harry van Dorenmalen, Chairman, IBM Europe

IBM: 100 years of transformation

Pre 1900	1900s	1910s	1920s	1930s	1940s	1950s	1960s	1970s	1980s	1990s	2000s

1911	Computing- Tabulating- Recording Company - IBM's predecessor
1924	The name International Business Machines Corporation registered
1936	IBM officially registered in Belgium
1940	IBM officially registered in the Netherlands
1943	First female VP (Ruth Leache)
1972	Welcome striped IBM logo
1992	Our stock price had collapsed, $8.1 billion loss.
1997	Chess Match between IBM's Deep Blue Supercomputer and chess champion Garry Kasparov.
2002	Acquisition PwCC
2004	PC division sold to China-based Lenovo Group for 1.75 Billion
2006	Innovation Jam, 77 countries, 3 days, 140.000 participants, and 37.000 ideas
2006	Global Integrated Company, IBM operates in 170 countries, with about 65 percent of our employees outside the U.S., including 30 percent in Asia Pacific. Our non-U.S. operations generate about 60 percent of IBM's revenue.
2007	IBM acquired up till now more than 60 Software companies
2009	President Obama Honors IBM's Blue Gene Supercomputer With National Medal Of Technology And Innovation
2011	100 years IBM

Agenda

1 The opportunity and the challenges

2 Smart Grids

3 Building out the infrastructure

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Why we need to get smarter

$93 billion

Total sales missed each year because retailers don't stock the right products to meet customer demand.

20% +

'**Travel time tax**' in major European nations (additional time spent travelling in peak travel times). UK, Benelux, Germany, France are worst performers.

25 billion

Global trading systems are under extreme stress, handling billions of market data messages each day.

6.8 quadrillion

Amount that European energy consumption, measured in BTUs, increased between 1996 and 2006
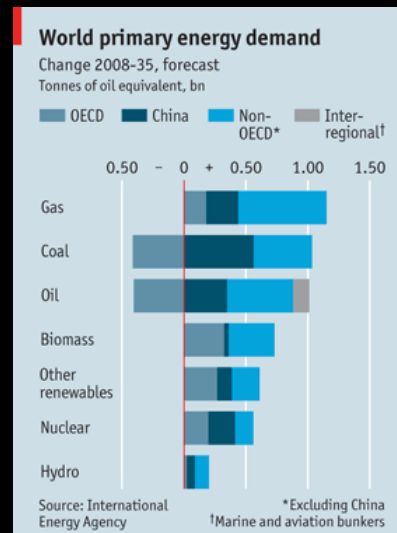
1.7 times

Amount that healthcare spending in OECD nations outstrips economic growth.

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Why we need to get smarter about energy

- European energy consumption un 6.8 quadrillion BTUs between 1996-2006
- Global energy consumption up 2.9% in 2011
- Global energy demand will grow 36% between 2008 and 2035
- China has overtaken USA as largest energy user
- Fossil fuels still dominant in 2035

World primary energy demand
Change 2008-35, forecast
Tonnes of oil equivalent, bn

OECD   China   Non-OECD*   Inter-regional†

0.50   –   0   +   0.50   1.00   1.50

Gas
Coal
Oil
Biomass
Other renewables
Nuclear
Hydro

Source: International Energy Agency   *Excluding China   †Marine and aviation bunkers

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The forces that are driving change

ENERGY SECURITY   DRIVE NEW INDUSTRY   CLIMATE CHANGE   CITY HEALTH

Automotive   **Consumer**

Increased regulation to reduce CO_2 emissions

Increasing consumer concern with environmental issues

Increased fuel efficiency standards

Consumer adoption increased by government subsidies

Increasing volatility in oil supply and price

Increasing urbanization and last mile transport needs

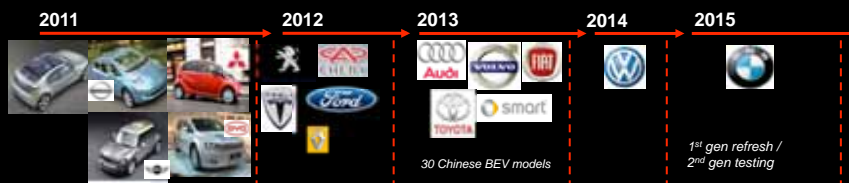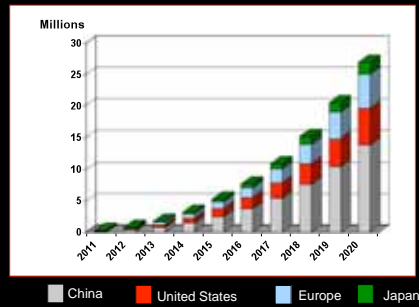*Improved technology and decreasing costs*
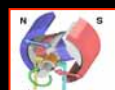
Consumer interest in alternative fuels and power trains

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Anticipated plug-in vehicle market size 2011-2020

- 5M EVs worldwide by 2015
- Approx 1M in Europe
- Germany, France, Italy and UK likely to account for 75% of EVs in Europe

Millions

China United States Europe Japan

| 2011 | 2012 | 2013 | 2014 | 2015 |

30 Chinese BEV models

1st gen refresh / 2nd gen testing

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Electric vehicle infrastructure: some of the challenges

1 Public 'charge post' availability = range anxiety

2 Mobile data = roaming, charging, metering issues

3 New customer services = new business processes

4 Adoption of EV – can the existing local grid handle it?

5 Large, mobile load = grid management challenges

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The EDISON project

- Real-life test-bed on island of Bornholm (pop.40,000)
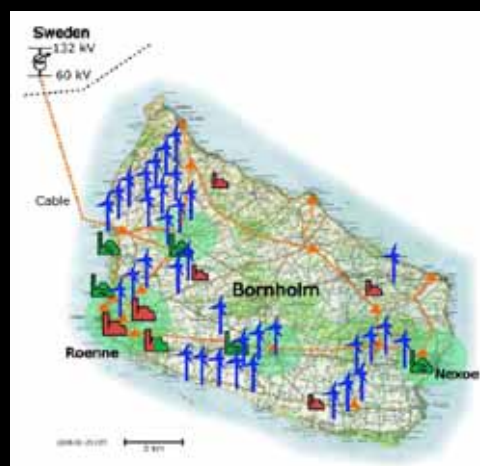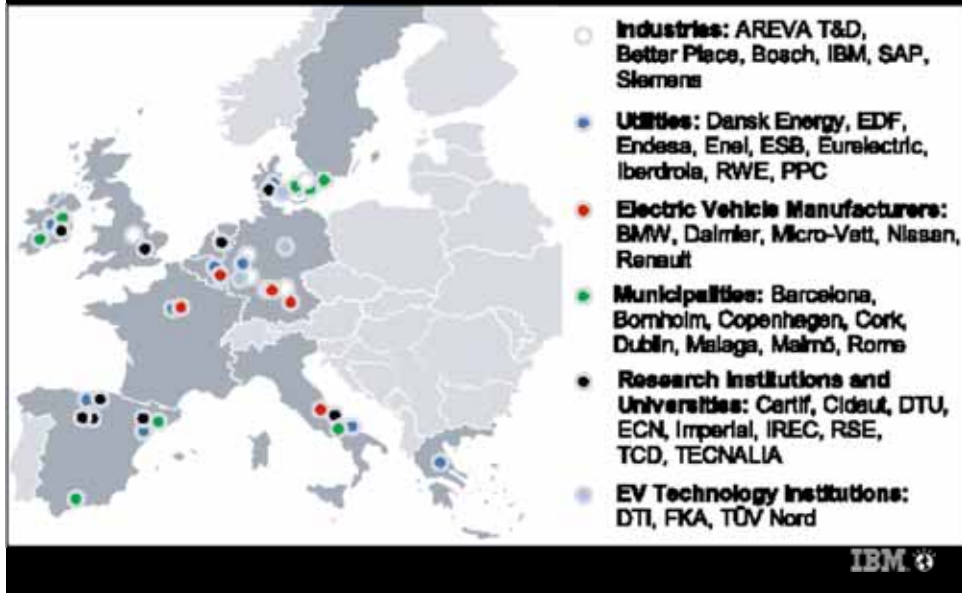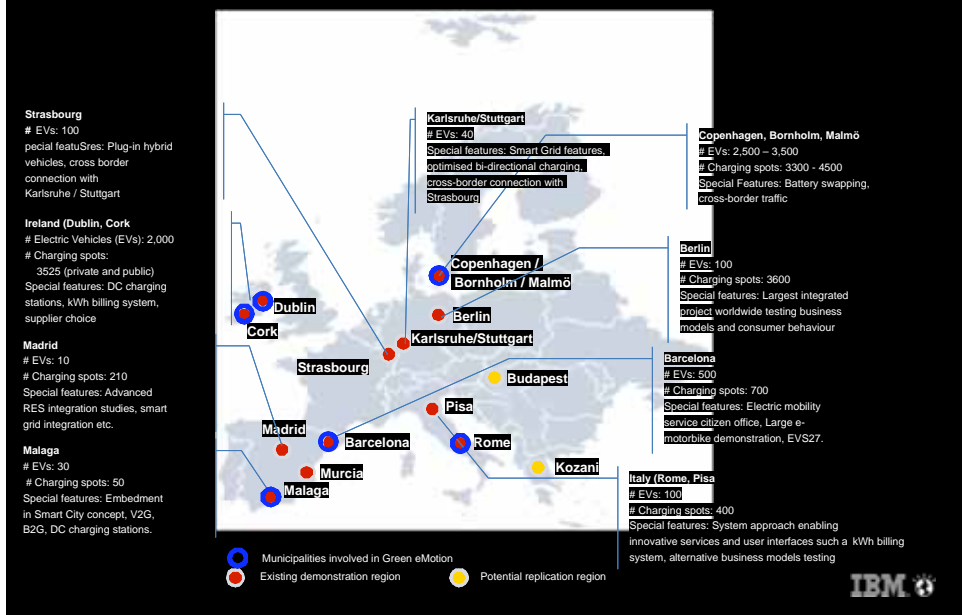- Design of an energy system for an entire country with support for large % EVs
- Focus on leveraging EVs to increase renewable energy
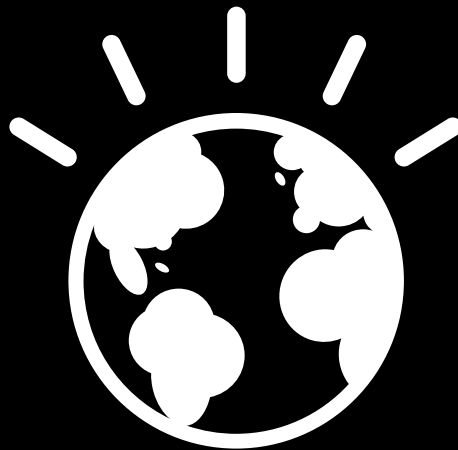

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The electromobility challenge: Green eMotion

Industries: AREVA T&D, Better Place, Bosch, IBM, SAP, Siemens

Utilities: Dansk Energy, EDF, Endesa, Enel, ESB, Eurelectric, Iberdrola, RWE, PPC

Electric Vehicle Manufacturers: BMW, Daimler, Micro-Vett, Nissan, Renault

Municipalities: Barcelona, Bornholm, Copenhagen, Cork, Dublin, Malaga, Malmö, Rome

Research Institutions and Universities: Cartif, Cidaut, DTU, ECN, Imperial, IREC, RSE, TCD, TECNALIA

EV Technology Institutions: DTI, FKA, TÜV Nord

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The electromobility challenge: Green eMotion

Strasbourg
EVs: 100
pecial featuSres: Plug-in hybrid vehicles, cross border connection with Karlsruhe / Stuttgart

Ireland (Dublin, Cork
Electric Vehicles (EVs): 2,000
Charging spots:
  3525 (private and public)
Special features: DC charging stations, kWh billing system, supplier choice

Madrid
EVs: 10
Charging spots: 210
Special features: Advanced RES integration studies, smart grid integration etc.

Malaga
EVs: 30
 # Charging spots: 50
Special features: Embedment in Smart City concept, V2G, B2G, DC charging stations.

Karlsruhe/Stuttgart
EVs: 40
Special features: Smart Grid features, optimised bi-directional charging, cross-border connection with Strasbourg

Copenhagen, Bornholm, Malmö
EVs: 2,500 – 3,500
Charging spots: 3300 - 4500
Special Features: Battery swapping, cross-border traffic

Berlin
EVs: 100
Charging spots: 3600
Special features: Largest integrated project worldwide testing business models and consumer behaviour

Barcelona
EVs: 500
Charging spots: 700
Special features: Electric mobility service citizen office, Large e-motorbike demonstration, EVS27.

Italy (Rome, Pisa
EVs: 100
Charging spots: 400
Special features: System approach enabling innovative services and user interfaces such a kWh billing system, alternative business models testing

Dublin
Cork
Copenhagen /
Bornholm / Malmö
Berlin
Karlsruhe/Stuttgart
Strasbourg
Budapest
Pisa
Rome
Madrid
Barcelona
Murcia
Kozani
Malaga

- Municipalities involved in Green eMotion
- Existing demonstration region
- Potential replication region

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To make this a success requires:

- Cross Government/industry leadership across Europe
  – Build out an intelligent EV infrastructure – and fast
- Interoperability
  – Plug & Play
- Customer focus – let's make this a compelling experience for them!
  – Customer delight will result in adoption

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www.ibm.com/energy

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