Electromobility in Norway

Roads to the future
Stockholm 13.03.2014
Erik Figenbaum

© Michael Sørensen, TØI
National targets anchored in:

- By 2020 Norway commit to reducing its GHG emissions to an equivalent of 30% of the 1990 emissions
- Norway plans to become carbon neutral by 2050.
- The average CO2-emission from new cars shall not exceed 85 g/km in 2020
- EV-incentives remains in place until the end of 2017 or until there are 50,000 on the road
- Local incentives must be seen in relation to the traffic situation
EV fleet 1997-2013

Slow but steady growth, national producers

3000 EV owners

Big car producers launched cars

0.8% of total fleet

Sources: Elbil på norsk, Asphjell et al 2013, OFVAS
**EV total market share 2010-2014**

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Market Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>-</td>
<td>0.0%</td>
</tr>
<tr>
<td>2011</td>
<td>-</td>
<td>0.0%</td>
</tr>
<tr>
<td>2012</td>
<td>-</td>
<td>0.0%</td>
</tr>
<tr>
<td>2013</td>
<td>-</td>
<td>0.0%</td>
</tr>
<tr>
<td>2014</td>
<td>-</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

**Sources:** OFVAS
EV non 4WD market share

Sources: OFVAS
Plug-in hybrids are a hard sell

- Plug in Hybrids had only 0,2% market share in 2013
- About 800 PHEVs in the fleet at the end of 2013.
Progress towards 85 g/km target in 2020

Government target: 120 g/km in 2012

White paper on climate change 2012: 85 g/km in 2020

Source: TØI/OFV AS
Why are EV sales taking off in Norway?

- EVs are attractive to buy
- EVs are attractive to own
- EVs are attractive to use
- EVs are most attractive for consumers
- More early adopter groups than other countries
- EVs are easy to sell
## EV incentives

<table>
<thead>
<tr>
<th>Incentive</th>
<th>Introduced</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAT exemption buying</td>
<td>2001</td>
<td>++</td>
</tr>
<tr>
<td>VAT exemption leasing</td>
<td>2014</td>
<td>+</td>
</tr>
<tr>
<td>Access to bus lanes</td>
<td>2003 test / 2005 permanent</td>
<td>++</td>
</tr>
<tr>
<td>Exemption from registration tax</td>
<td>1990 test / 1996 permanent</td>
<td>+</td>
</tr>
<tr>
<td>Free parking</td>
<td>1999</td>
<td>+</td>
</tr>
<tr>
<td>Free toll roads</td>
<td>1997</td>
<td>++</td>
</tr>
<tr>
<td>Reduced annual vehicle license fee</td>
<td>1996 free / 2004 low rate</td>
<td>+</td>
</tr>
<tr>
<td>Reduced rates on ferries</td>
<td>2009</td>
<td>0</td>
</tr>
<tr>
<td>Reduced company car tax</td>
<td>2000</td>
<td>0</td>
</tr>
<tr>
<td>Financial support for charging stations</td>
<td>2009</td>
<td>+</td>
</tr>
<tr>
<td>Financial support for fast charge stations</td>
<td>2011</td>
<td>+</td>
</tr>
<tr>
<td>Reserved EL number plates</td>
<td>1999</td>
<td>+</td>
</tr>
</tbody>
</table>

Almost all incentives in place prior to 2010
More early adopter groups

- Early adopters as in other countries, technology interested
- People with high time cost want Bus-lane access
- People who can save a lot on free toll roads
- People without free parking at work

- 2014 prices so low that everyone can be an early adopter

Tax policy and incentives have created an early majority
VAT exemption

- Most important consumer incentive in Norway - Evens out purchase prise for consumers

- With exemption: EV sale is biased toward consumers,
  - VAT on competing products not on EVs.
  - Fleets do not pay VAT.

- Without exemption: EV sales is biased toward fleets
  - consumers pay VAT on the extra cost of the EV over the ICE
  - fleets do not.

- consumers dominates EV-market in Norway
- fleets dominates in other European countries
Registration tax exemption

- Tax on CO2- and NOx-emissions, weight and engine power is added together.
- CO2 is negative below 105 g/km, the others are positive.
- The total tax cannot be negative.

Sources: www.VW.no Price lists
Tesla is attractive both as large and luxury car

Sources: http://nybilvelger.vegvesen.no/ and TØI calculations
How did EVs get so many incentives?

- 1990s: Remove economic barriers to get testing started
- 2000s: The dream of an EV industry in Norway
- 2010s: Climate policy

- Bottom-up pressure, not top-down measure.
- New pressure groups came to and contributed

- Was not expensive for the government in the beginning
- Easier not to collect a tax

- Always one more incentive needed to get the market going.
But early buyers needed the incentives

- In the start of 2011, Mitsubishi I-miev cost 240 000 NOK
- In 2014 the car in Citroën version is sold for 150 000 NOK
- Those buying a Think in 2009/2010 for 285 000 NOK is even worse off.
Plug-in hybrids have not been attractive

- High cost from manufacturers
- Little competition so far.

- Registration tax is not exempted, but it is reduced
- VAT is not exempted
- No local incentives

- BMW will only sell the i3 as BEV version in Norway
Awareness – Press articles

Source: Retrieval search: 09.03.2014, elbil or el-bil
Book: Elbil på norsk, Asphjell et al 2013, OFVAS
Awareness – Visibility

- In Oslo area EVs are seen everywhere and everyday
  - At work
  - At school
  - At kindergarten
  - At shopping centers
  - At a red light
  - In front of you
  - Friends have them

- Some municipalities have more than 5% EVs in total fleet

- EVs have a special number plate: EL 30000.

- EVs at car dealerships
- Very visible in advertising in Newspapers and TV
Electric vehicle landscape December 2011

Share of EVs in fleet

- 0
- 0-0.05%
- 0.05-0.25%
- 0.25-0.50%
- 0.50%-1.0%
- 1.0-2.0%
- 2.0-4.0%
- 4.0-8%
- >8%

Kartgrunnlag: Statens kartverk (cc-by-sa-3.0)

Copyright: TØI 2013
Electric vehicle landscape September 2013

Winter temperatures
December - February
1961-1990

Share of EVs in fleet

- 0
- 0-0,05%
- 0,05-0,25%
- 0,25-0,50%
- 0,50%-1,0%
- 1,0-2,0%
- 2,0-4,0%
- 4,0-8%
- >8%

Kartgrunnlag: Statens kartverk (cc-by-sa-3.0)

Copyright: TØI 2013
Electric vehicle landscape September 2013

Finnøy ~8% in fleet
Underwater toll road

Averøy ~5% in fleet
Underwater toll road

Asker ~5% in fleet
Bus lane and toll road

Copyright: TØI 2013

Kartgrunnlag: Statens kartverk (cc-by-sa-3.0)
Preliminary results EV owner survey 2014
Preliminary analysis of data, subject to change

- Survey of Members of the EV association.
- Everyone gets one year free membership when buying a new EV.

- 1850 respondents representing about 8 % of EVs in Norway
- 93% private owners (1722), the other respondents rejected

- Majority of respondents are first time owners (81%):
  - 47 % Nissan Leaf
  - 18% Tesla Model S
  - 19% Mitsubishi I-Miev, Peugeot Ion, Citroen C-zero
  - 16% Others

- Average age 46,5, 76% male,
- 3,2 persons in household
- High income, high education

Typical of early adopters and multicar owners

© TØI 2014
Preliminary results EV owner survey 2014
How did you usually travel to work/school before the EV was acquired?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Of those asked</th>
<th>Of everyone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ordinary car as driver</td>
<td>80</td>
<td>67</td>
</tr>
<tr>
<td>ordinary car as passenger</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Other EV as driver</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Other EV as passenger</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>By public transport</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Cycled</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Walked</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>This trip was not done prior to buying the EV</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td><strong>84</strong></td>
</tr>
<tr>
<td><strong>N</strong></td>
<td><strong>1450</strong></td>
<td><strong>1722</strong></td>
</tr>
</tbody>
</table>

CAUTION: We do not know if they would have bought another car anyway

© TØI 2014
Preliminary results EV owner survey Norway
Vehicle ownership

Question: is the number of vehicles in the household the same after buying the EV?

- 28% says the EV is an additional vehicle
- 4% did not have a car before

CAUTION:
- We do not know if they would have bought a new vehicle anyway
Charging – EV owner survey 2014
Preliminary, not corrected for the 7% non private cars

How do you charge your EV?

- Hjemmelading i garasje
  - Daglig: 36,74%
  - 3-5 ganger i uka: 16,10%
  - 1-2 ganger i uka: 16,10%
  - 1-2 ganger i måneden: 6,75%
  - Sjelden: 2,87%
  - Aldri: 3,48%

- Hjemmelading i carpark eller utendørs parkering
  - Daglig: 7,95%
  - 3-5 ganger i uka: 10,46%
  - 1-2 ganger i uka: 7,23%
  - 1-2 ganger i måneden: 7,82%
  - Sjelden: 41,08%

- Arbeidsplasslading
  - Daglig: 7,0%
  - 3-5 ganger i uka: 23,03%
  - 1-2 ganger i uka: 10,61%
  - 1-2 ganger i måneden: 7,12%
  - Sjelden: 8,09%
  - Aldri: 30,42%

- Offentlige ladestasjoner
  - Daglig: 6,53%
  - 3-5 ganger i uka: 13,28%
  - 1-2 ganger i uka: 28,76%
  - 1-2 ganger i måneden: 28,39%
  - Sjelden: 14,14%

- Ladestasjoner på kjøpesenter o.l.
  - Daglig: 10,93%
  - 3-5 ganger i uka: 10,93%
  - 1-2 ganger i uka: 28,49%
  - 1-2 ganger i måneden: 29,89%
  - Sjelden: 21,32%

- Hurtigladestasjon om sommeren
  - Daglig: 4,53%
  - 3-5 ganger i uka: 20,67%
  - 1-2 ganger i uka: 29,19%
  - 1-2 ganger i måneden: 36,96%

- Hurtigladestasjon om vinteren
  - Daglig: 4,82%
  - 3-5 ganger i uka: 19,39%
  - 1-2 ganger i uka: 25,46%
  - 1-2 ganger i måneden: 37,71%
Factors for buying – EV owner survey 2014
Preliminary, not corrected for the 7% non private cars

Which factors influenced you to choose to buy an EV?

- Det var beste bil for mitt behov
- Jeg er interessert i ny teknologi
- Elbilens sikkerhet
- Elbil er miljøvennlig
- Konkurransedyktig pris
- Lavere årsavgift
- Lavere driftskostnader
- Adgang til å igjøre i kollektivfelt
- Gratis bompassering
- Gratis fører
- Gratis parkering på offentlige parkeringsplasser
- Det fantes en elbilforhandler i nærheten
- Mitt foretrukne bilmærke førte elbil
- Elbil er i tiden
- Annet

© TØI 2014
Preliminary results EV owner survey 2014

- EVs model year 2011-2013 drive about 13-14000 km/year
- Most travelling during the day can be accomplished
- More planning needed and some trips requires an alternative

- 80% use the EV 6-7 days/week
- 16-17% use the EV 3-5 days/week

- About 84% drive the EV to work/school at least 3 times per week. These were asked about bus lane and toll road usage:
  - 40% (of 1722) can use a bus lane and have time savings of:
  - 58% pass a toll road
Preliminary results EV owner survey 2014
Analysis of raw data, subject to change

- 87% would buy an EV again (higher than earlier surveys)
- 0.6% would not buy an EV again

- 91% bought the car from a dealer, of those 9 out of 10 had decided they wanted an EV before they went to the dealer.

**Informasjon sources:**
- Media: 77%
- Friends/family: 29%
- Car dealer: 13%
- Work: 8%
- Organizations: 6%

**Word of mouth:**
- Do you have friends or family who bought or consider buying an EV as a consequence of your experiences?
  - 36% know someone who have bought
  - 39% know someone that considers
Conclusion

- Powerful purchase and user incentives drives up demand
- Larger early adopter groups than other countries
- Sales spreads out from hot spots around cities
- New models accelerates sales
- High level of awareness and visibility
- Long EV history
- Word of mouth and the media are information channels
- People have positive experiences and tell their friends
- Cars are used in everyday traffic, average yearly distance
Challenge – EV sales other markets

European EV sales 2010-2013


©TØI 2014
Challenge - PHEV sales other markets
More information

- www.toi.no
- efi@toi.no
- www.compett.org