Electromobility - Back to the future
13 September 2018

Business potential of electric vehicles in Sweden

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RISE Viktoria – Electromobility
The overall aim of all activities in the Electromobility area is to increase the knowledge and contribute to the conversion from fossil fuels to more electric kilometers in all type of transportations!

~30 projects yearly
~25 people
Some statistics for Sweden
Chargeable vehicles in Sweden

www.elbilsstatistik.se

Chargeable vehicles in Sweden

AUGUSTI 2018

TOP 3

1. PASSAT GTE 11278
2. OUTLANDER 8143
3. V60 3743

Total number 60256

PHEV

73 %

BEV

27 %

Growth last 12 month 59 %

Prognosis 2018-12-31 72000

*CPEV är antal laddpunkter per laddbar bil
Development chargeable cars in Sverige
Where are we?

**Mainstream Markets**

**Early Market**
- Scarcity
- Visionaries: Get ahead!
- Technies: Try it!

**The chasm**

**Late Market**
- Pragmatics: Stick with the herd!
- Conservatives: Hold on!
- Skeptics: No way!

**Innovators** 2.5%
**Early Adopters** 13.5%
**Early Majority** 34%
**Late Majority** 34%
**Laggards** 16%

\[
\frac{60256}{4845609} = 1.2\%
\]
Chargeable vehicles

- Still a fraction of chargeable cars in relation to all existing ones...
- If the Swedish 2030 target is to be achieved (70% reduction of CO2 emissions compared to 2010), much of the vehicle fleet needs to be electrified, existing vehicles need biofuels [https://www.viktoria.se/projects/20-fifty](https://www.viktoria.se/projects/20-fifty)
- Battery is key component in chargeable vehicles with batteries. Must decrease in price and increase in performance!
- What are the attributes the customers are willing to pay for?
  - Car customers are irrational and with differences preferences!
  - Most customers do not know what the total-cost-of-ownership is for cars!
  - For commercial vehicles total-cost-of-ownership is essential.
BEVs or PHEVs?


LCA-analysis: Equivalent!

Country
- DE
- US

Typ
- BEV
- PHEV

Sample Size
- 10
- 1,000
- 100
- 10,000

annual electric kilometres

all-electric range in km
Driving forces

Let’s put our heads together to keep ahead.
Motivation for electrification

- Energy and fuel security
- Create and support business in own country
- Accidents & Injuries
- Local emissions
- Traffic jam, parking jam
- Green house gas emissions
- Stabilize fluctuating renewable power
- Quiet, smooth, nice performance...

Mainly top down driving forces for electromobility!
- What do customers want?
- Is there a *more profit* business case for commercial vehicles?
Business models
Business models

- The rationale of how an organization creates, delivers, and captures value, in economic, social, cultural or other contexts.


- Many business models may apply for the same product, e.g. selling car, leasing car, renting car

- Costs are usually simpler to estimate

- Revenue depends on the value proposition

## Business models – Osterwalders canvas

<table>
<thead>
<tr>
<th><strong>Key Partners</strong></th>
<th><strong>Key Activities</strong></th>
<th><strong>Value Propositions</strong></th>
<th><strong>Customer Relationships</strong></th>
<th><strong>Customer Segments</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Who are our key partners?</td>
<td>What key activities do our value proposition require?</td>
<td>What value do we deliver to the customers?</td>
<td>What type of relationship does each of our customer segment expect us to establish and maintain with them?</td>
<td>For whom are we creating values?</td>
</tr>
<tr>
<td>Who are our key suppliers?</td>
<td>Our distribution channels?</td>
<td>Which one of our customer’s problems are we helping to solve?</td>
<td>Which ones have we established?</td>
<td>Who are our most important customers?</td>
</tr>
<tr>
<td>Which key resources are we acquiring from partners?</td>
<td>Customer relationships?</td>
<td>What bundles of products and services are we offering to each customer segment?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Which key activities do partners perform?</td>
<td>Revenue streams?</td>
<td>Which customer needs are we satisfying?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Key Resources</strong></th>
<th><strong>Channels</strong></th>
<th><strong>Cost Structure</strong></th>
<th><strong>Revenue Streams</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>What key resources do our value proposition require?</td>
<td>Through which channels do our customer segments want to be reached?</td>
<td>What are the most important costs inherent in our business model?</td>
<td>For what value are our customers really willing to pay?</td>
</tr>
<tr>
<td>Our distribution channels?</td>
<td>How are we reaching them now?</td>
<td>Which key resources are most expensive?</td>
<td>For what do they currently pay?</td>
</tr>
<tr>
<td>Customer relationships?</td>
<td>How are our channels integrated?</td>
<td>Which key activities are most expensive?</td>
<td>How would they prefer to pay?</td>
</tr>
<tr>
<td>Revenue streams?</td>
<td></td>
<td></td>
<td>How much does each revenue stream contribute to overall revenues?</td>
</tr>
</tbody>
</table>

Electric road systems - different solutions

- Overhead lines
- Rail
- Wireless (induction)
Electric roads creates a systems-of-systems and a business eco system with several actors and new roles.
Car in smart home - Holistic perspective
User inputs are crucial

Demonstrators for evaluating user behavior – Living labs

Identify problems, possibilities and hinders; validate business models
Electrified buses – potential business ahead

Årliga kostnader inklusive avskrivning och ränta för linje 18 och 19

<table>
<thead>
<tr>
<th></th>
<th>Fordon</th>
<th>Infrastruktur</th>
<th>Batteri</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avskrivningstider</td>
<td>10 år</td>
<td>20 år</td>
<td>10 år</td>
</tr>
</tbody>
</table>

https://www.viktoria.se/projects/eaeb-energiforsorjningsalternativ-for-elektrifierade-bussystem-energy-transfer-solutions
Promotion of electric vehicles
How can we speed up the Electromobility pace?

- Bonus-malus (1 juli 2018), environmental zones (1 January 2020 – two more zones), municipalities support chargeable vehicles, support for charging infrastructure

- Continue to and increase the fund research in the Electromobility area
  - Technology, behaviour studies, business models – support Swedish OEMs (FFI), and lab and live Demonstrations

- Company cars represent a considerable share of the total new cars sales on the Swedish market, so promote chargeable cars as company cars. Also creates a fast growing second-hand market.
  [https://www.viktoria.se/projects/believe-ii](https://www.viktoria.se/projects/believe-ii)

- Make charging infrastructure simple and cost efficient
  - Interoperability between different charging posts/suppliers,
    - Same payment method
    - Same user interface
    - [https://www.viktoria.se/projects/roaming-electric-vehicle-charging](https://www.viktoria.se/projects/roaming-electric-vehicle-charging)
  - Inductive charging for convenience
    - WiCh-project: [https://www.viktoria.se/projects/wich](https://www.viktoria.se/projects/wich)
    - ALPEN-project: [https://www.viktoria.se/projects/ALPEN](https://www.viktoria.se/projects/ALPEN)
How can we speed up the Electromobility pace

- Charging solutions for multi-family houses in cities
  - [https://www.viktoria.se/projects/hemmaladdning-for-flerfamiljshus-i-stader-fallstudie-goteborg](https://www.viktoria.se/projects/hemmaladdning-for-flerfamiljshus-i-stader-fallstudie-goteborg)
  - Introduce law that cannot hinder people from install charging possibilities if they pay for it.

- Increasing electric car sales

- Subsidize electricity for vehicles (?)
  - The ELVIIS-project: [https://www.viktoria.se/projects/elviis](https://www.viktoria.se/projects/elviis)

- Airbnb for electric vehicle charging...
Conclusions

LET´S PUT OUR HEADS TOGETHER. TO KEEP AHEAD.
Conclusions

- Hard to reach the Swedish greenhouse gases goals – electrification important part of the solution
- We need to promote Electromobility – multiple possibilities and all needed
- New ecosystems implies project cooperation to understand and create values – holistic perspective
- Research is very important – not only in technology but also to study behaviour and validate business models
THANKS!

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