EV range investigated

- WP6 Vehicle performance-

Rally to Brussel

September 18th

Lars Overgaard DTI

Green eMotion

European Commission

EV range !?

NewsRoom

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AAA NEWSROOM > AUTO > EXTREME TEMPERATURES AFFECT ELECTRIC VEHICLE DRIVING RANGE, AAA SAYS

Extreme Temperatures Affect Electric Vehicle Driving Range, AAA Says

By John Goreham G+ 2013-09-20 17:26

2014 Honda Fit EV solves some issues, but range is still a problem

Our quick spin in the new 2014 Honda Fit electric vehicle convinced us that it has overcome all of the drivability issues of early EVs, but range is still a serious concern. Even buyers of city cars, who might choose a Fit may have trouble making this their only vehicle.

The new 2014 Honda Fit is now on-sale, or on-lease more accurately, in selected markets in the US including the Northeast. At a recent auto-writers event we were lucky enough to have a chance

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...n to Blog

consumer organizations asking for more realistic vehicle testing

12-14-12 | Peter Mock

...emission values for type approval of new cars are determined under laboratory conditions. But ...world driving cannot be perfectly simulated in the laboratory; for example, in laboratory testing it is ...ned that the vehicle is always driven on a flat surface, when of course in reality the earth is not flat. Thus, type approval values will always deviate somewhat from the values drivers experience on the road. However, one would expect this "normal" deviation between type-approval and real-world emission levels to remain approximately constant over time. There is no reason to assume that people nowadays drive much ... analysis of historical data suggests that the gap between ... increased dramatically over the last few years. In a study ...bout 28,000 German car owners, ICCT found that the gap ...1% in 2010.

...might be the flexibilities and tolerances allowed by the current ...le manufacturer might use very efficient tires for the actual

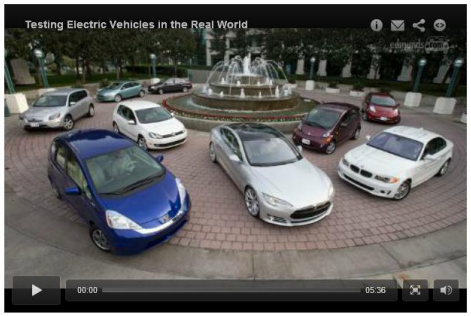
Electric vehicle problems still ignored

Bill Lloyd, 61, a retired Australian mechanical engineer, patent attorney and vintage car collector drives his 1915 Detroit electric car in Sydney.
PHOTO: Romeo Gacad, AFP/Getty Images

Testing Electric Vehicles in the Real World

By Dan Edmunds | Published Jan 9, 2013

Bring up the topic of electric cars and the conversation will soon drift to the issue of range. It's understandable because we've all been conditioned to think that anything below 250 miles is insufficient.



But that's gasoline talking. EVs are fundamentally different, as our Electric Car Comparison Test shows. You plug them in at home and charge them overnight while you're asleep, waking up with a full "tank" every morning instead of making a weekly detour on the way to work, where you grit your teeth as you watch the

Problem statement

The real world range of an electric car varies a lot according to weather and driving style.

ISO 8714 - like most standardized vehicle tests - uses fixed laboratory conditions.
ISO 8714 driving range do therefore not reflect real world driving. This means:

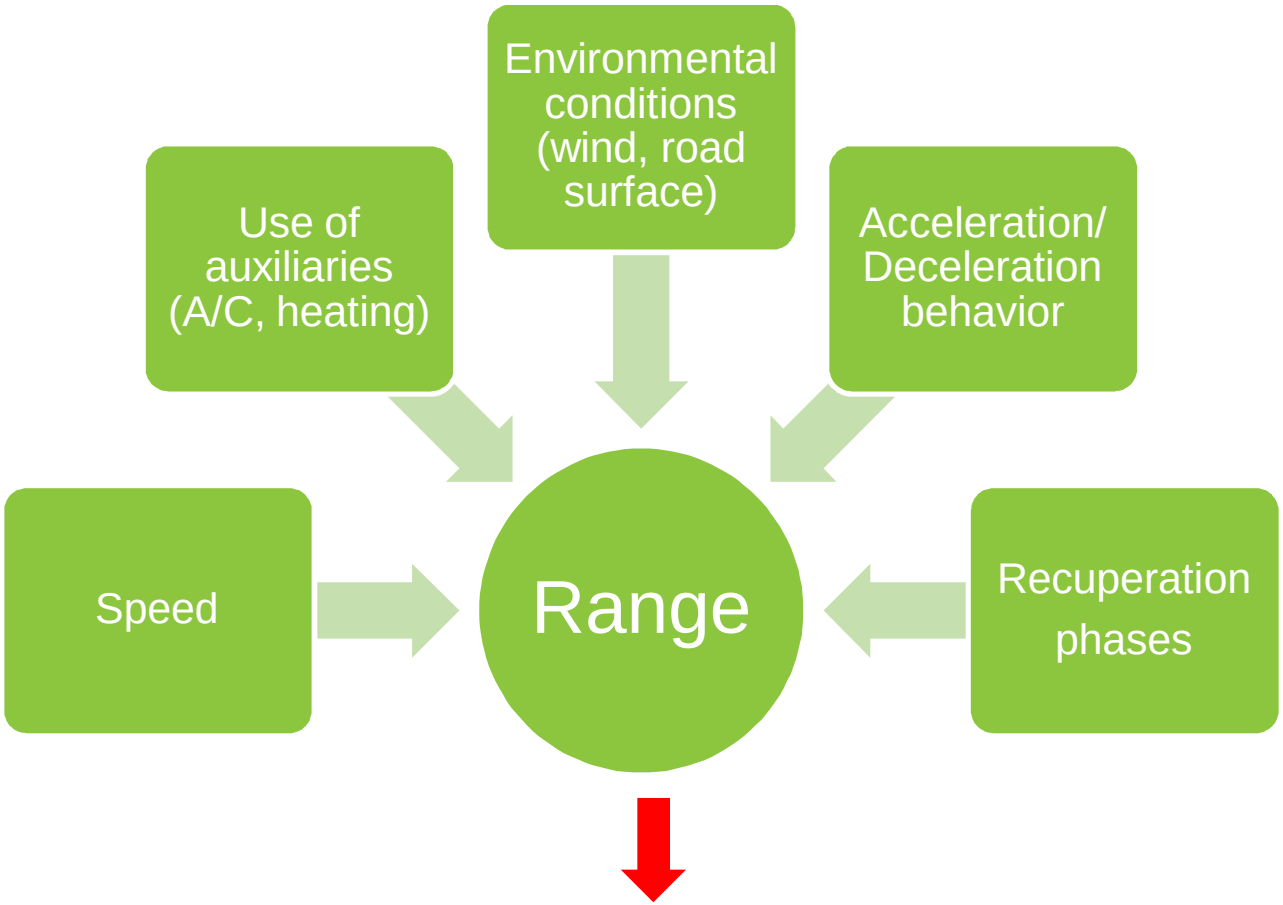
=> It is difficult to predict the actual range
=> Uncertainty about usability of electric cars

Summary of the Nissan's results using EPA L4 test cycle operating the Leaf under different real-world scenarios[56][57]								
Driving condition	Speed		Temperature		Total Drive Duration	Range		Air conditioner
	mph	km/h	°F	°C		mi	km	
Cruising (ideal condition)	38	61	68	20	3 hr 38 min	138	222	Off
City traffic	24	39	77	25	4 hr 23 min	105	169	Off
Highway	55	89	95	35	1 hr 16 min	70	110	In use
Winter, stop-and-go traffic	15	24	14	−10	4 hr 08 min	62	100	Heater on
Heavy stop-and-go traffic	6	10	86	30	7 hr 50 min	47	76	In use
EPA five-cycle tests[48]	n.a.					73	117	Varying

ISO 8714 (for Europe) 175

Too large variation

Range critical components



Range depends not just on the <u>car</u> but on the driving <u>behavior</u> and <u>weather</u> conditions!

Driving cycle SORDS developed in Green eMotion

- Standardized On Road Driving Schedule -

Real world on road testing!

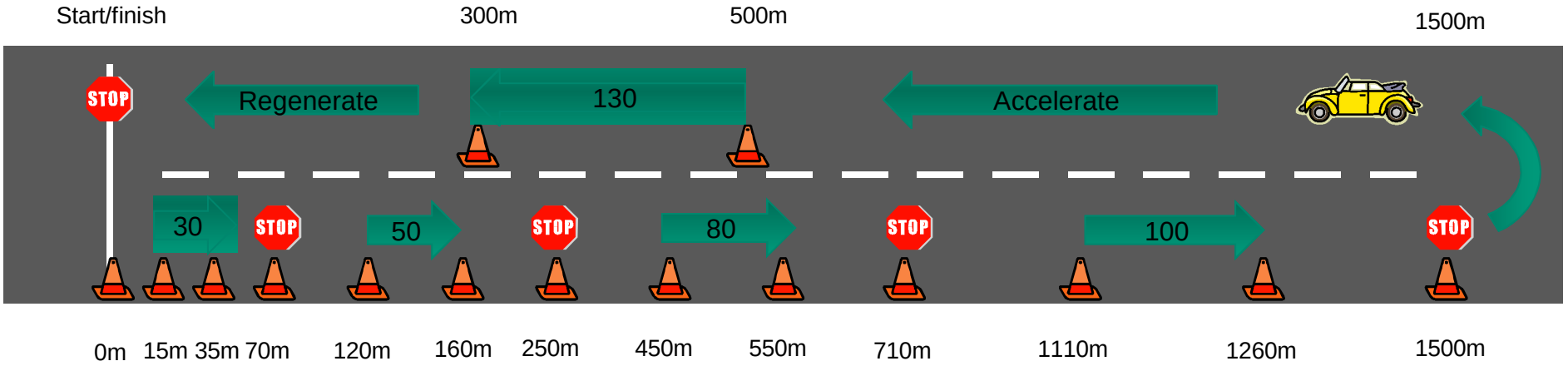
Since there is no official test cycle to be used on the road for passenger vehicles, the team designed a new procedure named SORDS (Standardized On-Road Driving Schedule) inspired by the UITP-SORT test for city buses.

Dynamic drive pattern testing!

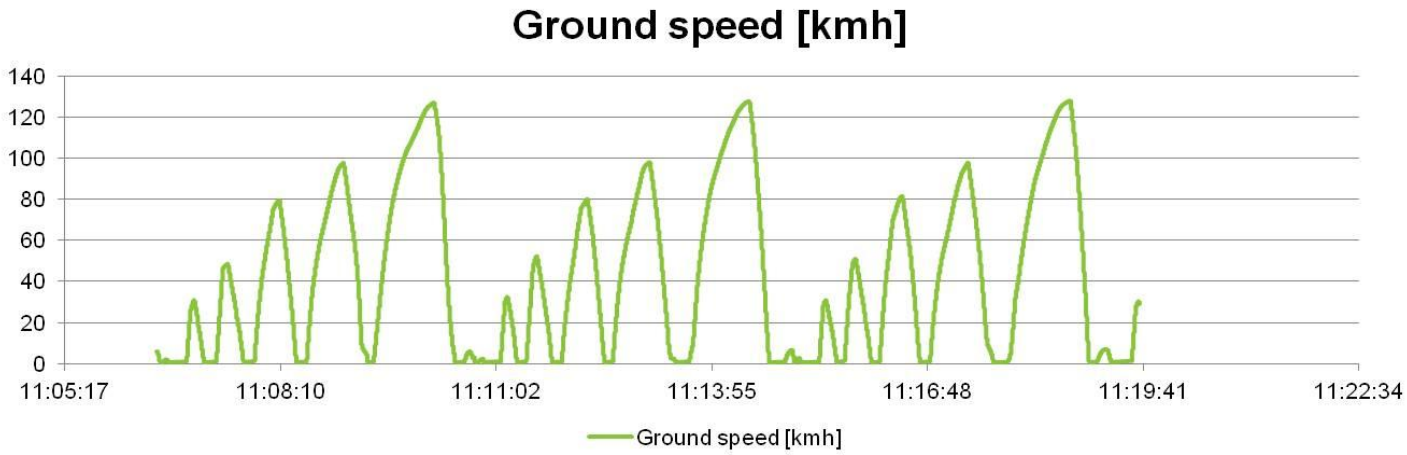
The different sections of SORDS represent conditions from heavy urban to motorway driving.

Proposals for a more qualified range estimation

- New testing methodology SORDS -



STOP = 10 seconds



Proposals for a more qualified range estimation

- Range correction methodology -

To make an accurate range prediction we need:

1. **Available battery capacity**
2. **External forces on the vehicle**
3. **Driveline efficiency**
4. **Auxiliary power usage**

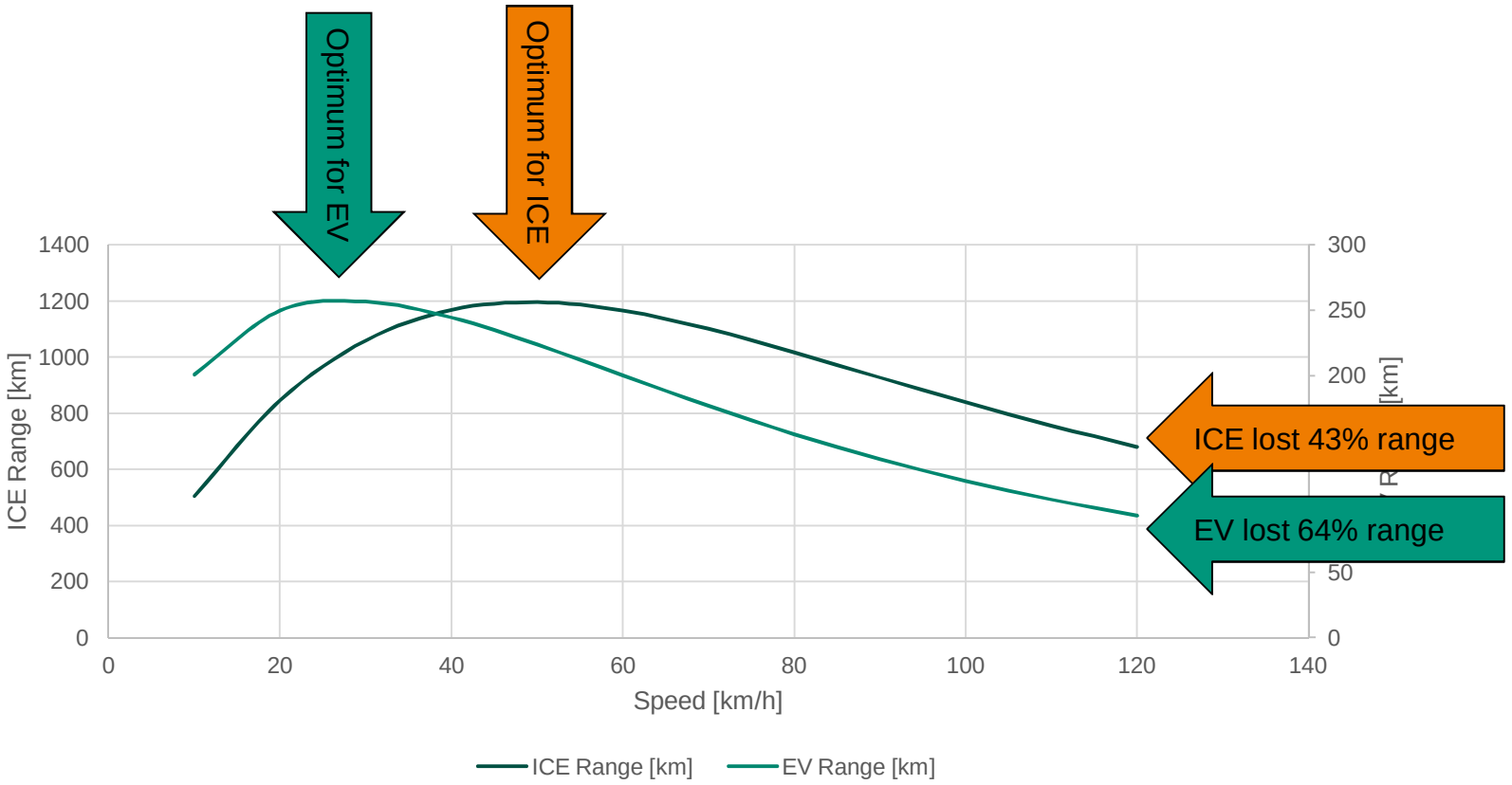
Available capacity depends on temperature and SOC.

External forces on the vehicle can be predicted with accurate weather data (wind speed and direction) combined with gps-data (speed, heading and elevation).

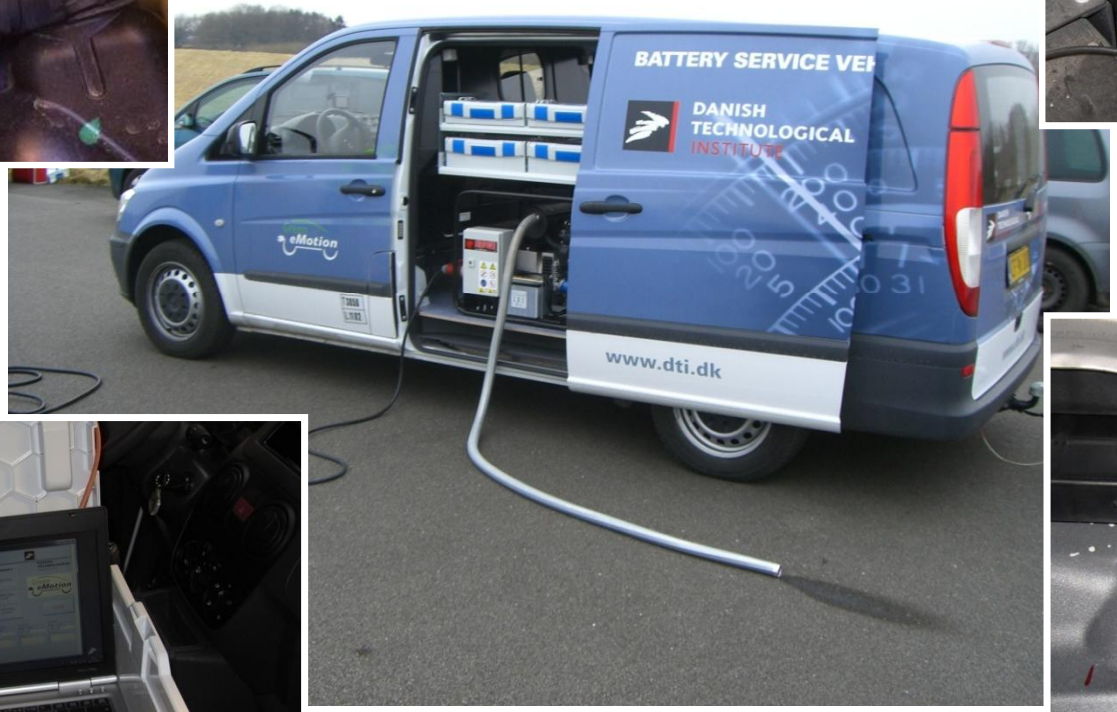
Driveline efficiencies can be derived from SORDS testing.

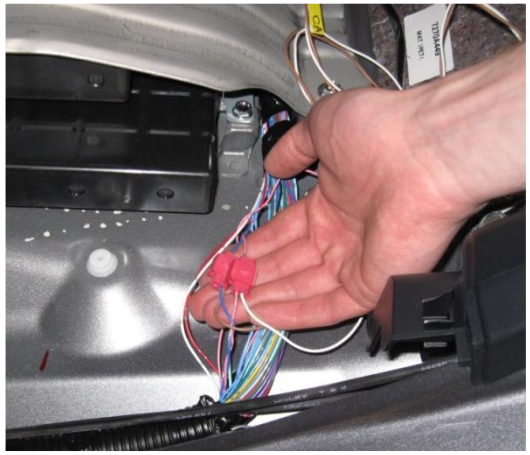
Auxiliary power depends mostly on temperature.

How important is speed for Electric Vehicles?



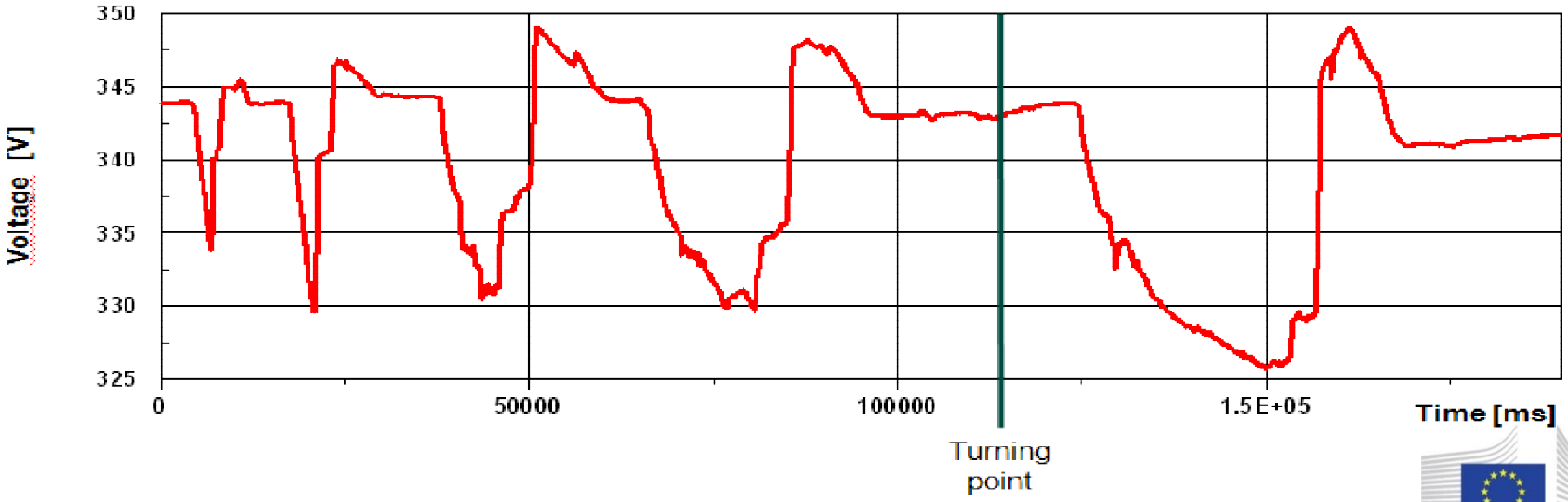
How did we do it – On road real world testing SORDS



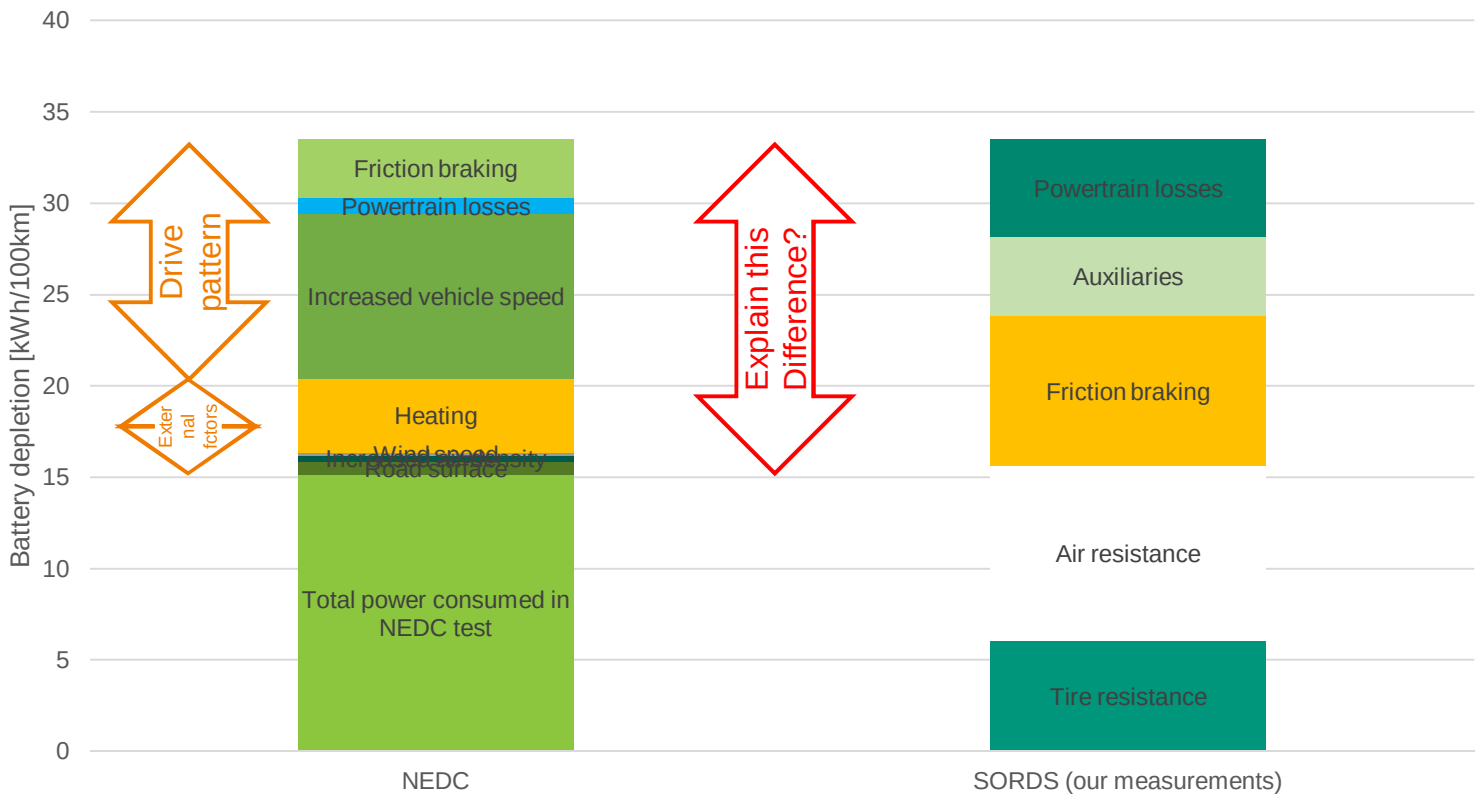


How did we do it – On road real world testing SORDS

Validation – Climate chamber testing SORDS-



Results; Power consumption and drive pattern



Conclusions

- Accurate range prediction is crucial for both the users and the service providers
- There is no single value that represents the „true“ range of an electric vehicle
- Range is not simply an attribute of the car model
- Range is very much depending on driving style, route and weather
- Excessive speed more costly for an EV than a regular car
- Braking technique in cities is important
- Educate yourself as an EV driver

Thank you
for your attention.