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Energy & Transport

“the RekkEVidde”

Assessing Range and Performance of Electric Vehicles in Nordic Driving Conditions

“the RekkEVidde” Objectives

- Produce realistic performance figures for EVs attributed to Nordic driving and weather conditions
- Agree what kind of additional testing is done for EV’s apart from the regulatory test (ECER No. 101)

Create market acceptance for EV´s

Consortium

Coordination

greennet FINLAND

Laboratory testing

VTT

Field testing

TSS
Test Site Sweden

Transportøkonomisk institutt
Stiftelsen Norsk senter for samferdselsforskning

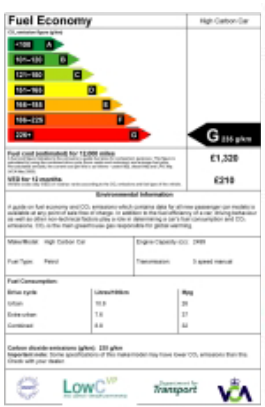
STOCKHOLMS STAD

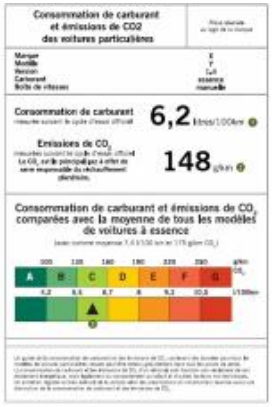
ÍSLENSK NÝORKA ehf
ICELANDIC NEW ENERGY Ltd.

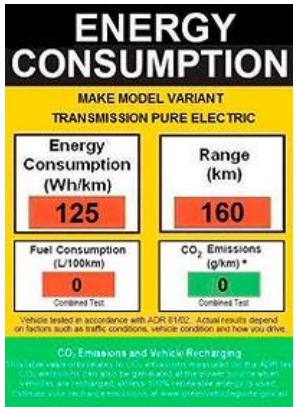
Project content

WP0 Coordination and Dissemination
WP1 Duty cycle analysis
WP2 Test protocol tools
WP3 Application of the laboratory test protocol on 3 EV types
WP4 Field test of EV pool

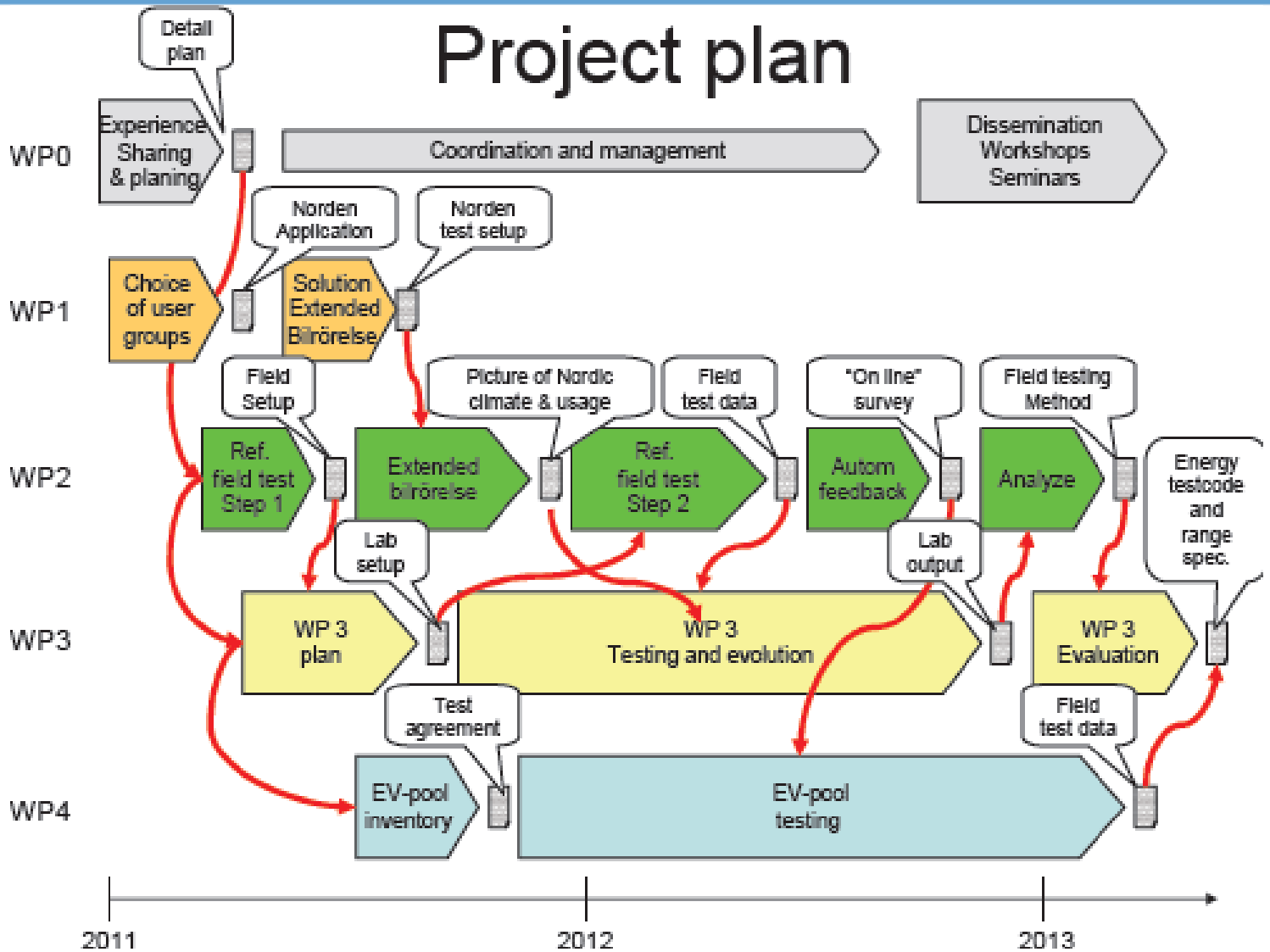
Finding during project: Energy labeling for EV´s will be studied





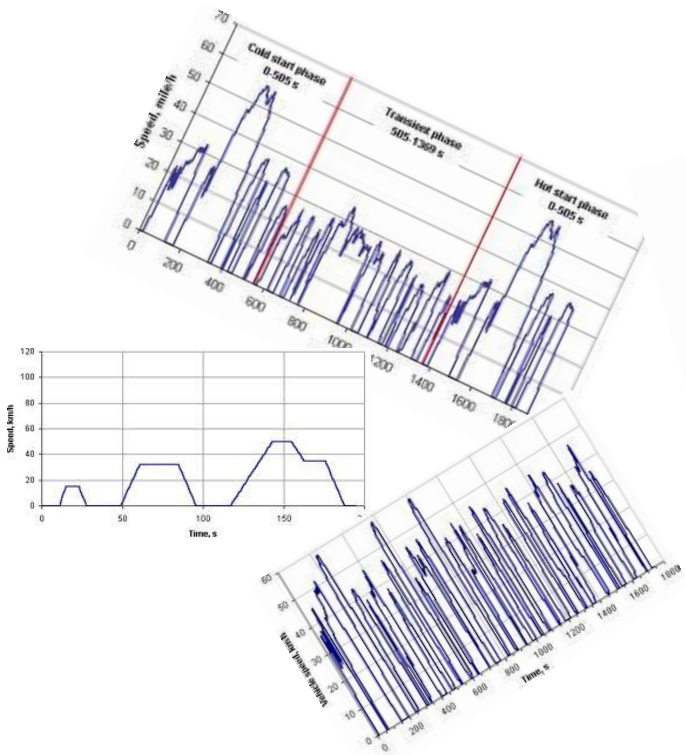


Project plan

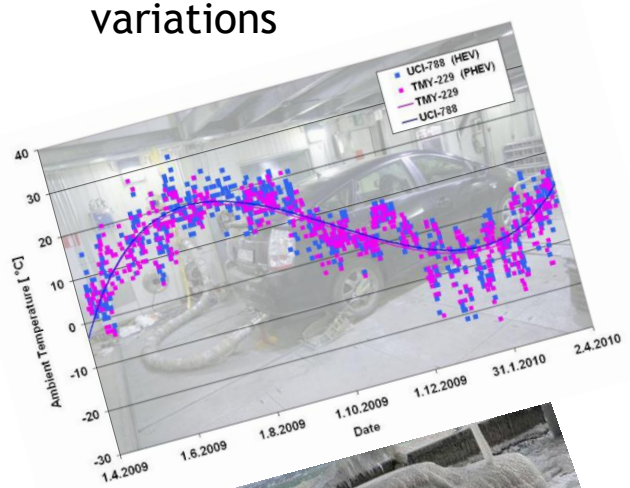


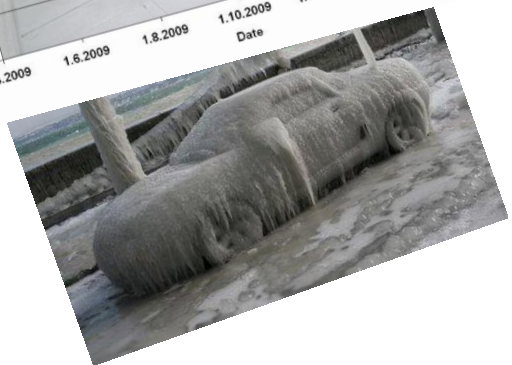
WP1 Duty cycle analysis

Study of the Driving Cycles



Temperature &road condition variations





Typical trips&loads

TSS: Bilrörelse

NORSTART

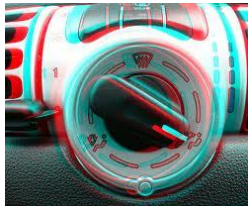
WP2 Test protocol tools

Field drive input from 80-100 ICE-vehicles will be logged

Test temperature and charging

Preheating of cabin during charge allowed at test protocol?

Cabin heating & auxiliary energy use

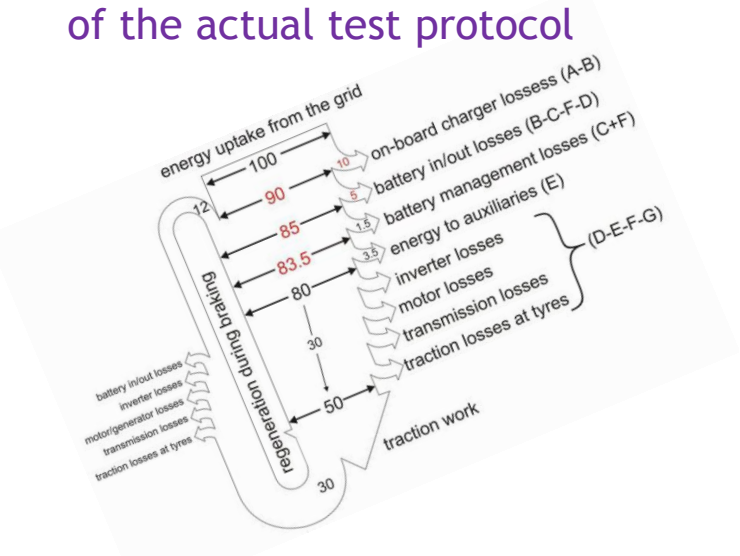


Vehicle load?
Useful range criteria?
Climb home range?

WP3 Application of the laboratory test protocol on 3 EV types

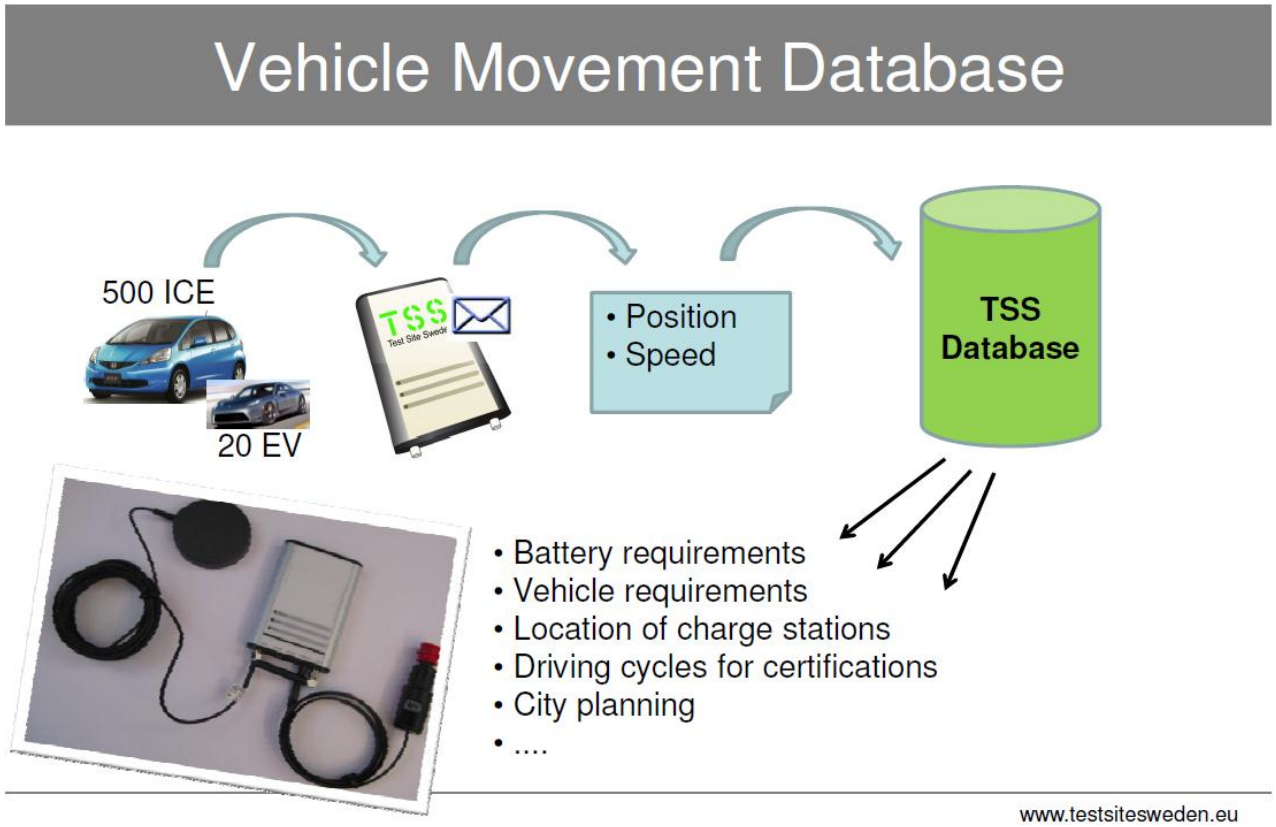

Citroën C-Zero on in test cell at VTT

Energy consumption (kWh/km) from the grid and efficiency inside EV are nice to know but not part of the actual test protocol

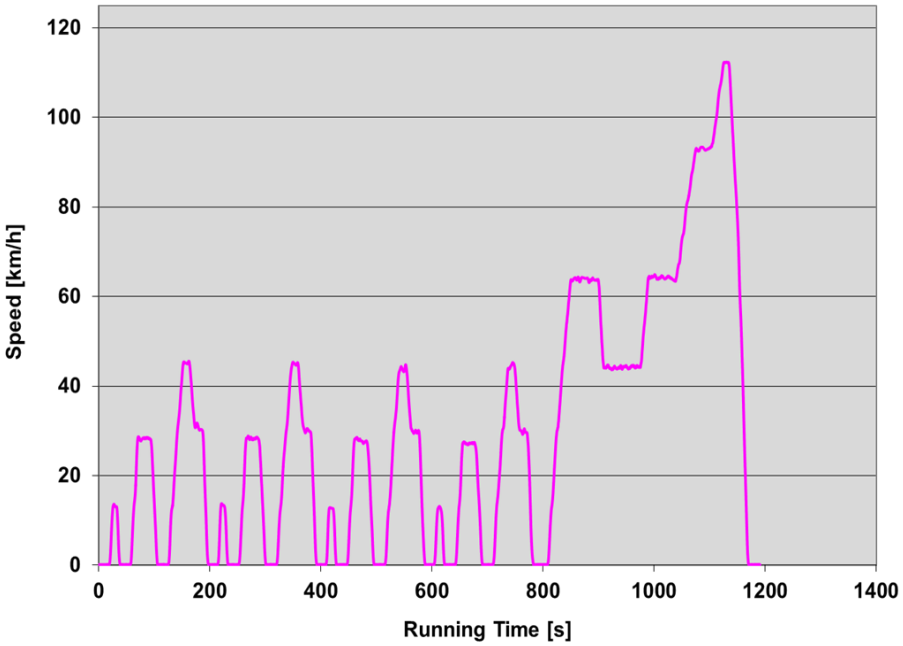


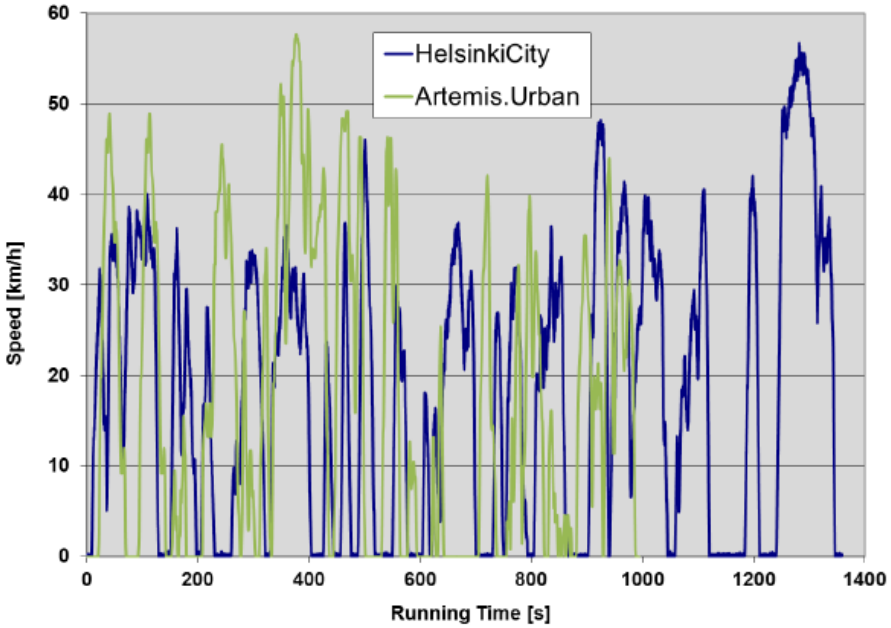
Useful driving range in Nordic conditions and accuracy of SOC meter are key figures to be tested!

WP4 Field test of EV pool



Lab test performed with 5 driving cycles





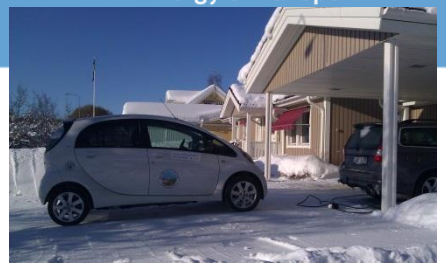
3 cycle profiles out of 5 as an example

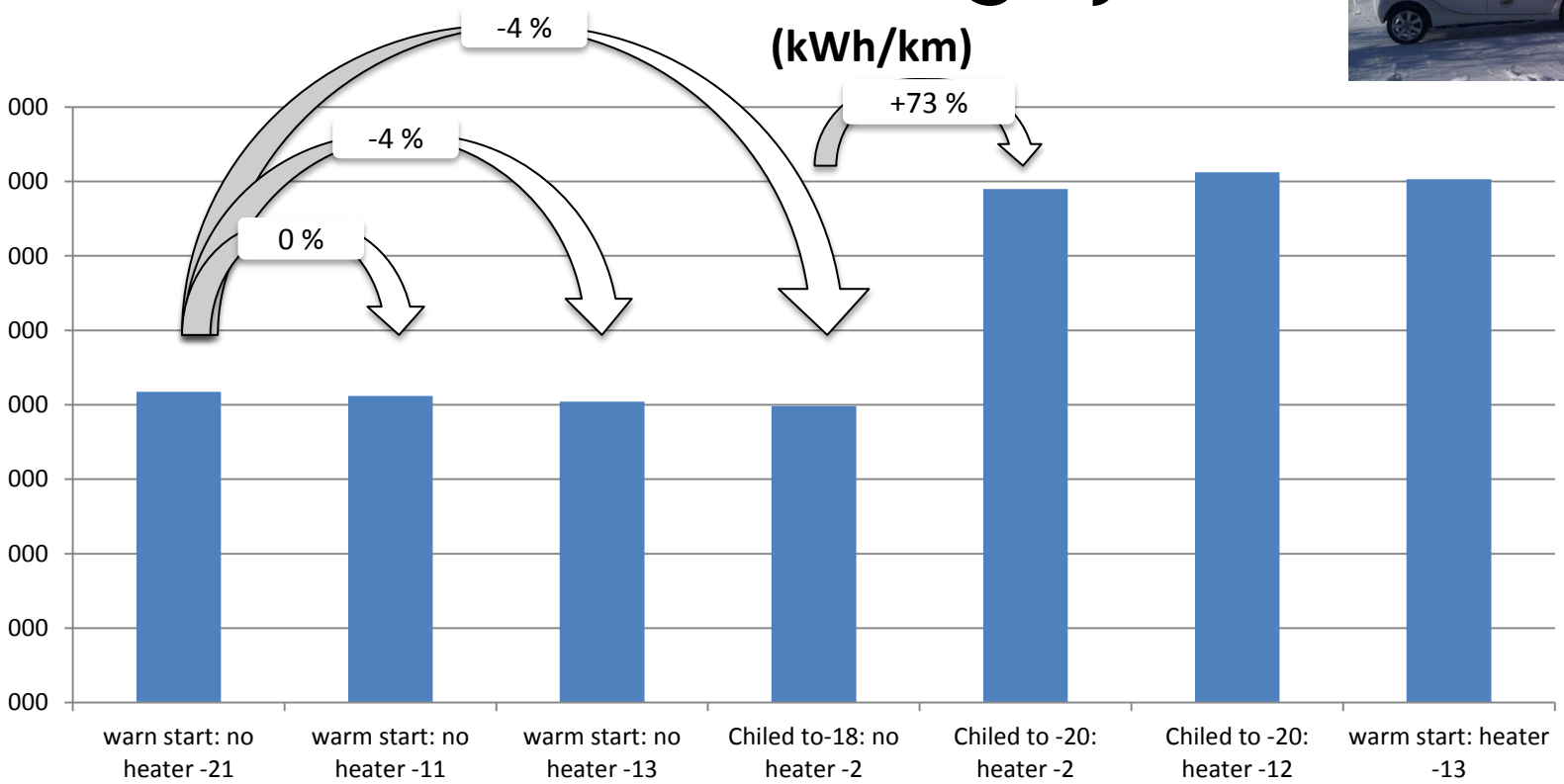
Citroën C-Zero lab test results cabin heater off

cycle	estimated range +23 °C km	estimated range -20 °C km	difference -20 vs. +23 %
EURO	124	88	-29 %
Helsinki City	125	106	-15 %
Artemis Urban	99	74	-26 %
Road, FIN	91	70	-23 %
Artemis Road, EV*	113	90	-20 %
Artemis Motorway, EV*	72	53	-26 %
average, all cycles	100	79	-21 %

*EV denotes that warm-up part of the cycle is omitted

Field test NEDC driving cycle





Circular track (about 33,5 km)
Energy consumption:

- No heater 0.20 – 0.21 kWh/km
- With heater 0.34 -0.36 kWh/km

Conclusions:

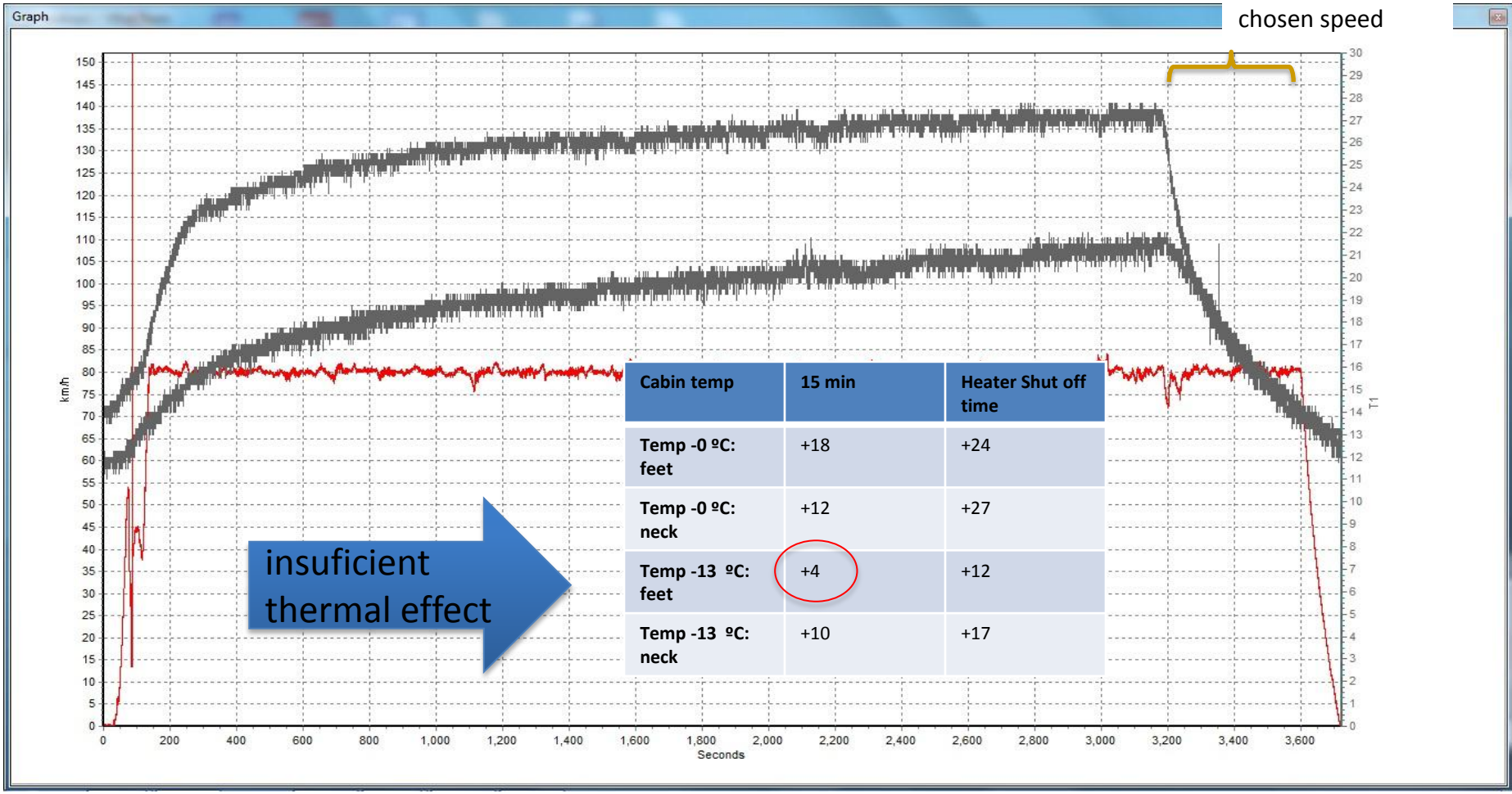
4% less energy in higher temp (-13 ºC). Without heater (same at -2 ºC with cold start)

0% diff at -11 ºC due to snow on road..

73% more with heater on from a cold start

Constant speed 80 km/h. Temp -1ºC
Range-drop from 78 to 68 km when driving in -13ºC

Heater shut off gives 9 km left at chosen speed



Cabin temp	15 min	Heater Shut off time
Temp -0 ºC: feet	+18	+24
Temp -0 ºC: neck	+12	+27
Temp -13 ºC: feet	+4	+12
Temp -13 ºC: neck	+10	+17

Range testing method has influence on EV system design and market

- Preconditions will have a great importance in the cold testing
  - If vehicle interior preheating from the electric grid is made possible before range testing
    - ➢ EV manufacturers will adapt pre heating system in their production EVs

- Nordic climate countries represent a limited market potential for vehicle manufactures
  - If range test is too difficult and varies from normal testing
    - ➢ EV manufactures may not apply tests in their vehicles

WP0 Dissemination

Dissemination Policy:

•Protocol development will be open for comments
•Co-operation with electric vehicle manufacturers is welcome

Time schedule:

11/2012 Lab-test protocol
03/2013 Database of lab test results
06/2013 Database of in-field test results
09/2013 Database of in-laboratory and in-field test programme results
11/2013 Final report

Contact Information

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