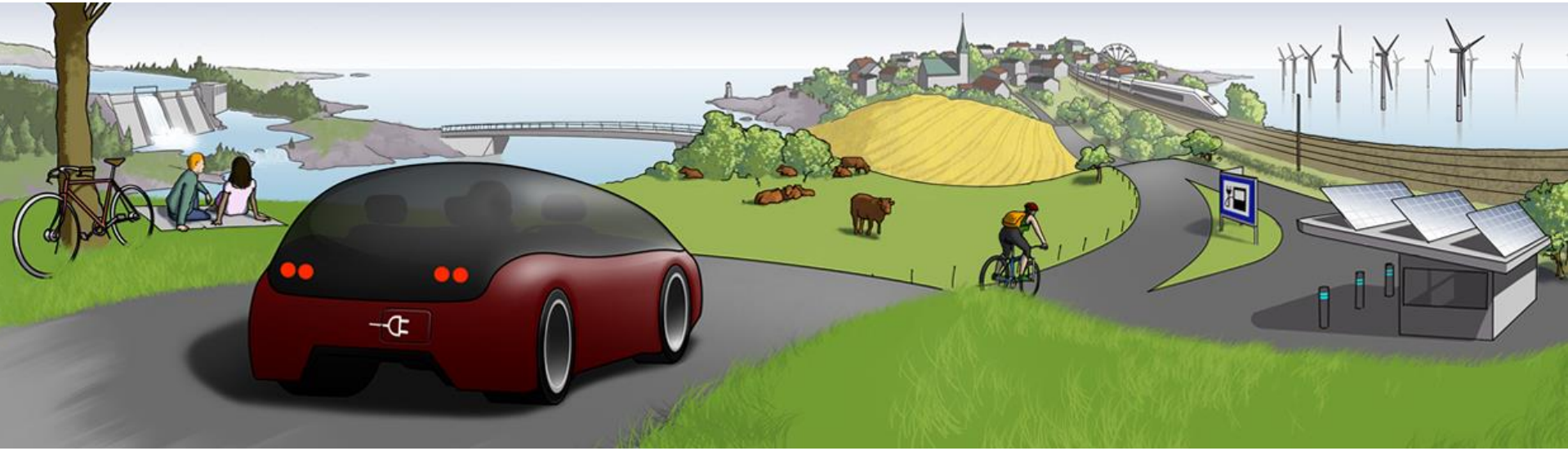
The BTH Approach for Fast Sustainability Transition of Energy and Transport Examples from GreenCharge 2011-2015

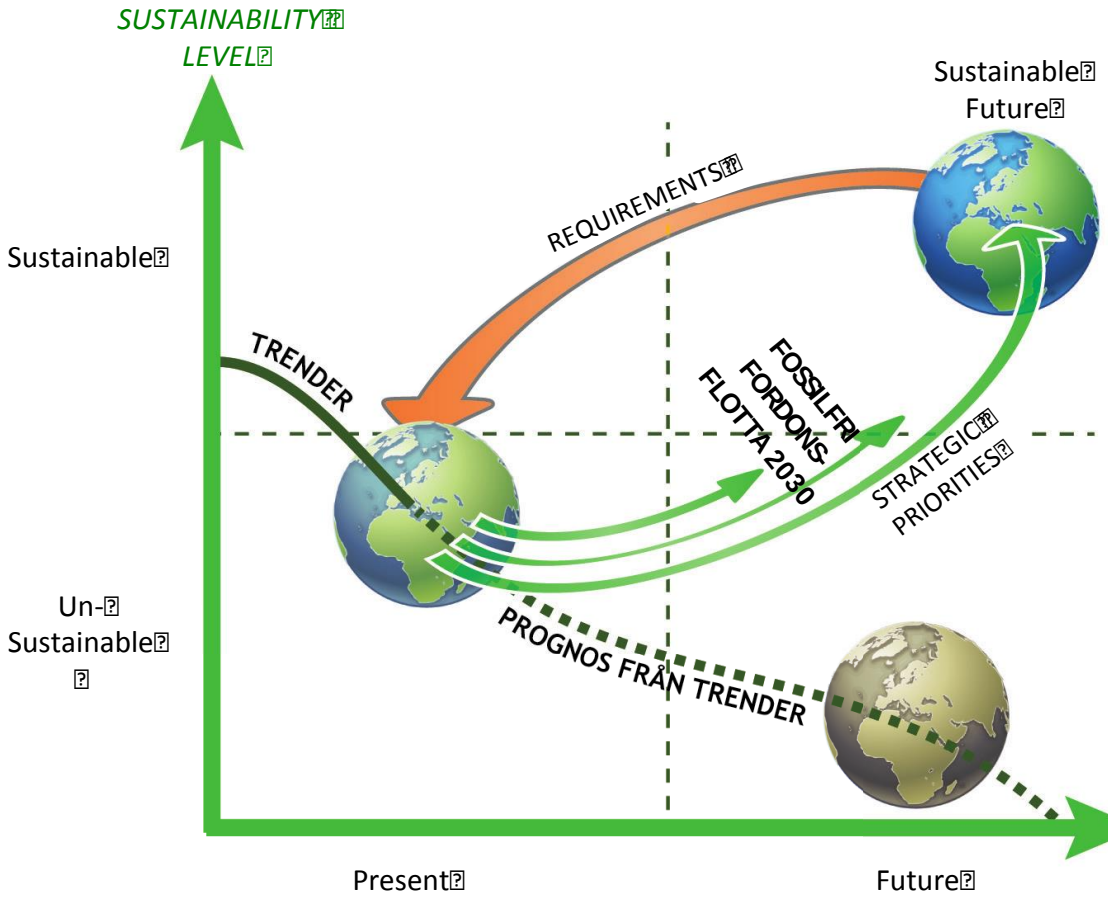


Dr. Henrik Ny, Blekinge institute of technology (BTH)

Spring 2017

WHY SUSTAINABILITY?

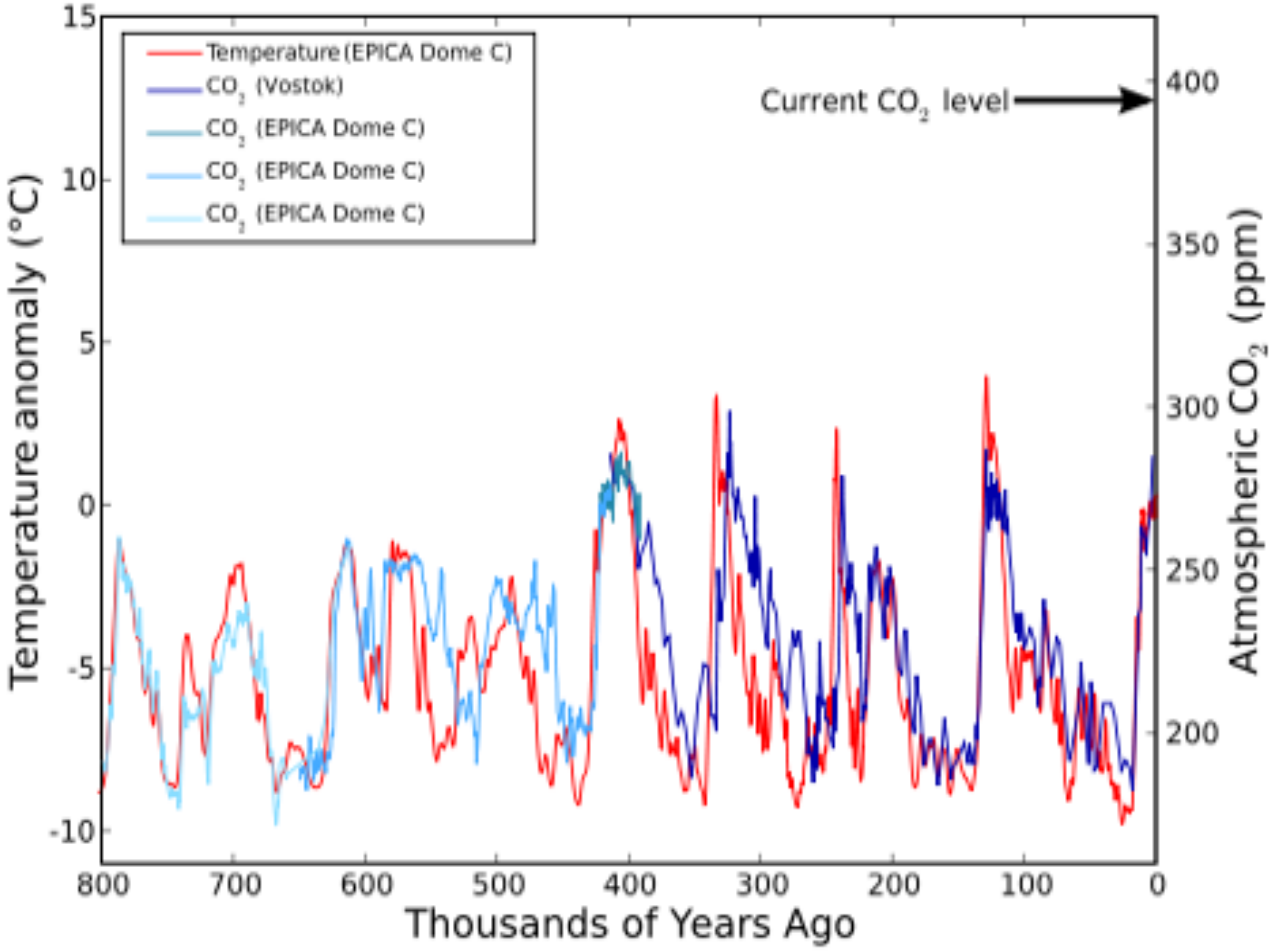
Sustainability – Challenge AND Opportunity



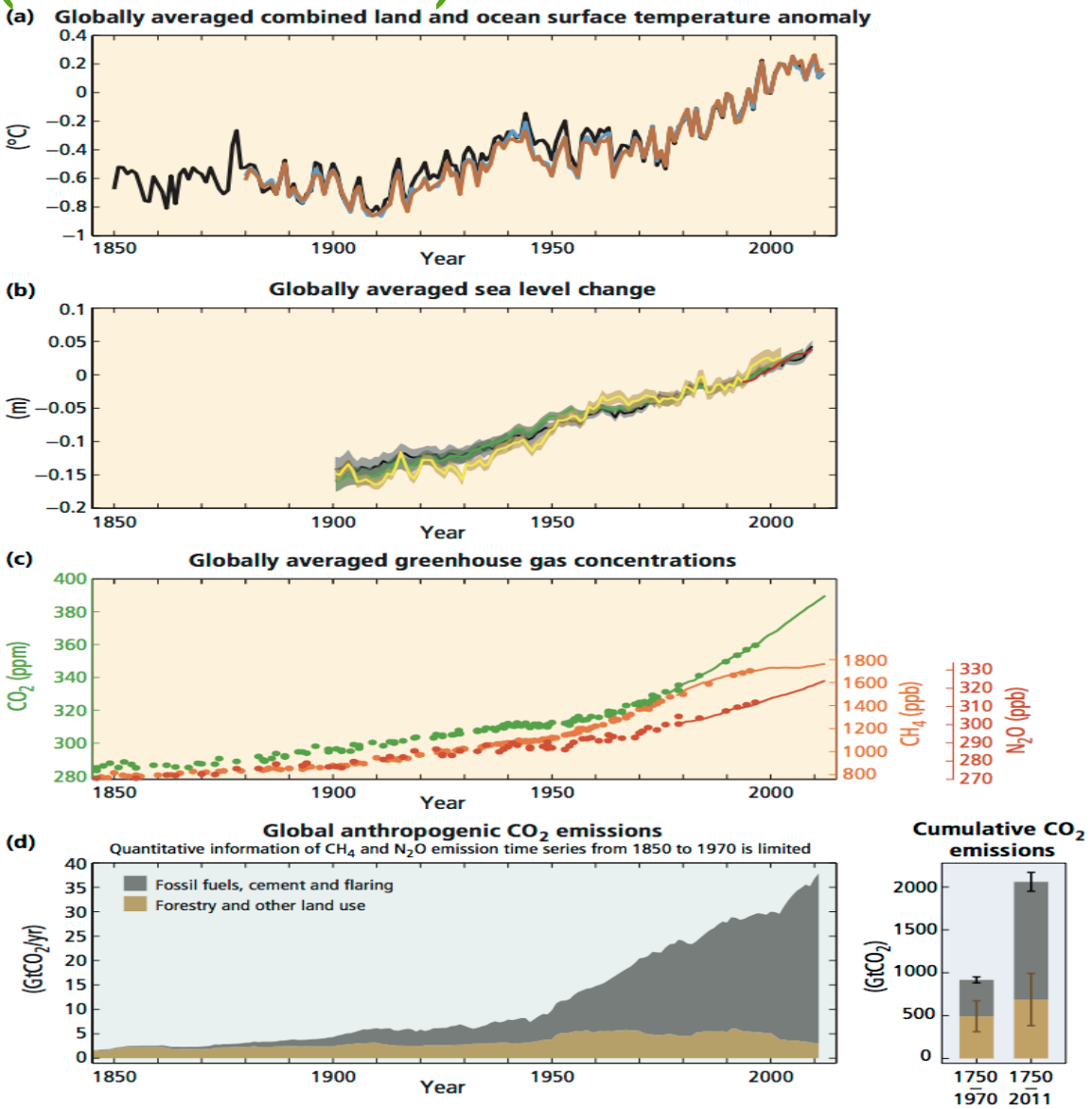
Unsustainability = Negative trends

- Incr. population
- Incr. emissions (CO_2, etc)
- Declining ekosystems
- Declining metals reserves
- Declining trust

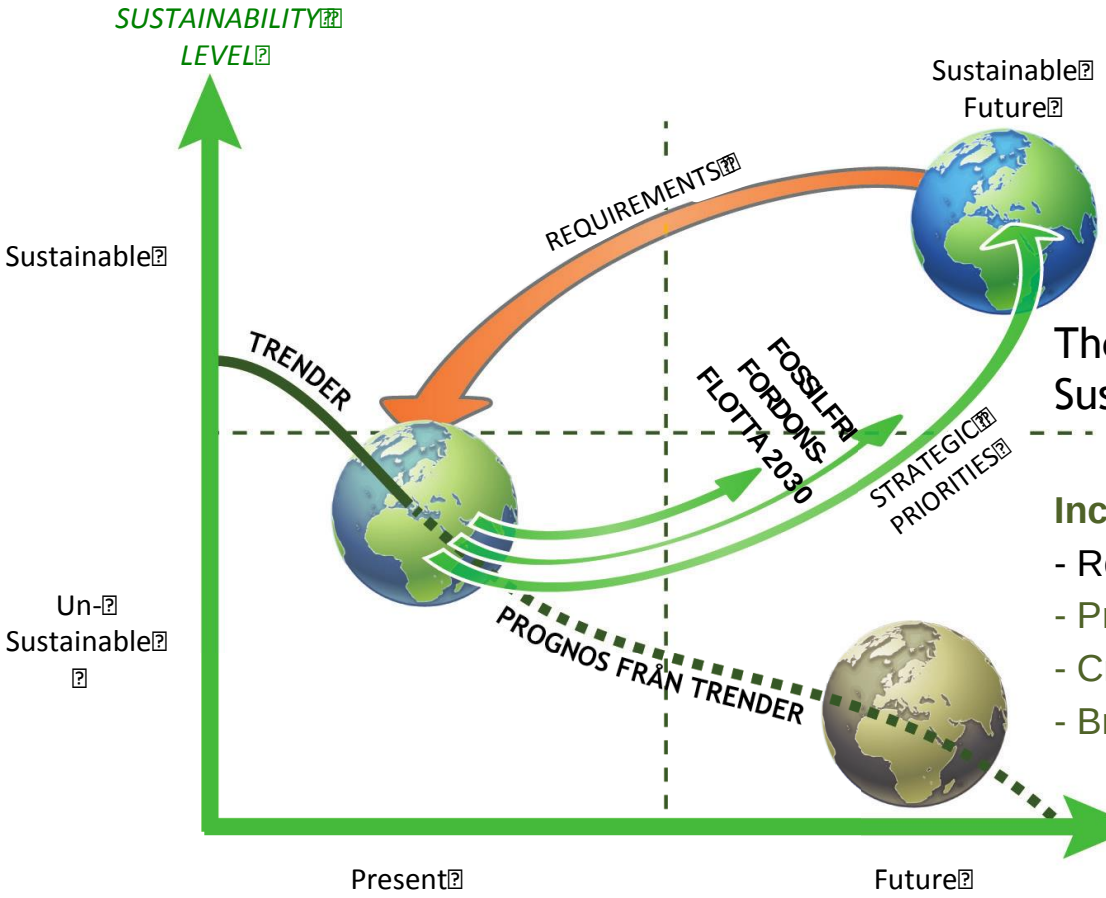
Climate gases and temperature (source: IPCC)



Climate gases and temperature (source: IPCC)



Sustainability – A Business Opportunity

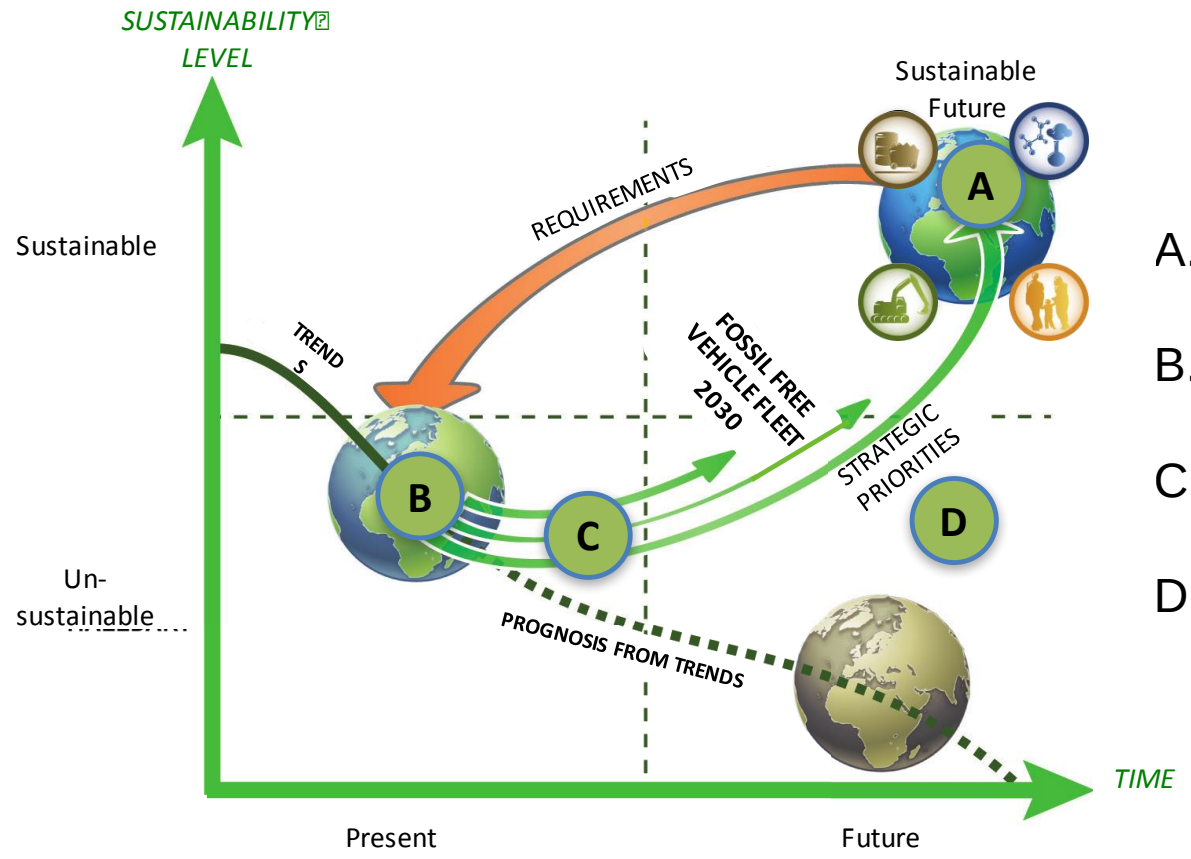


The Business Case for Sustainability

Increasing (+)	Decreasing (-)
- Revenues	- Resource costs
- Producttivity	- Waste costs
- Credibility	- Taxes
- Brand	- Insurance premiums

THE BTH APPROACH?

A Strategic Planning Procedure



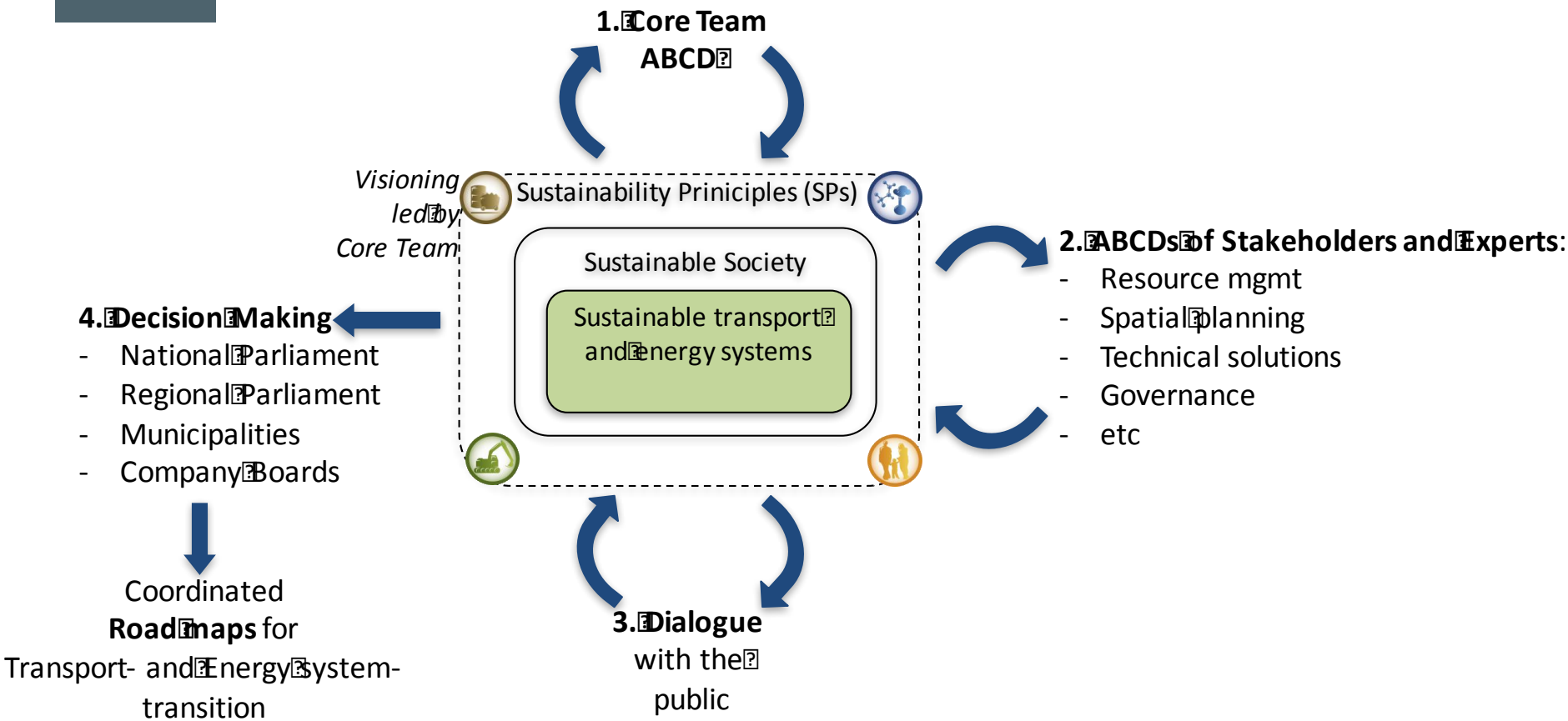
A. Visioning

B. Current Reality

C. Potential Solutions

D. Scenarios and Road Maps

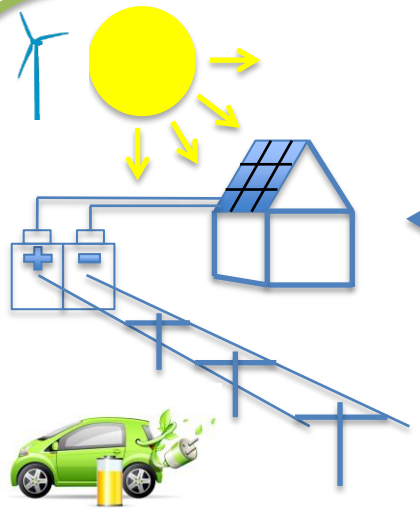
A Strategic Approach – for Societal Sectors



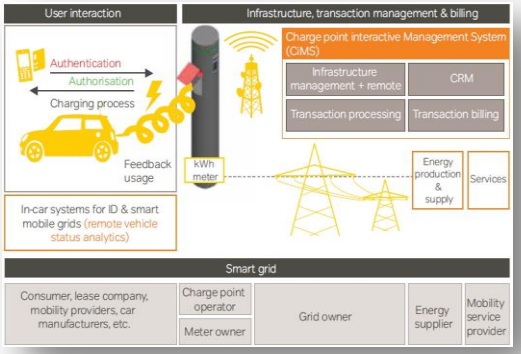
EXAMPLES FROM GREENCHARGE

GreenCharge - A BTH Project 2011-2015

Lead Partner (BTH)



The whole value chain



IT – support
(CGI)

Project Mgmt
(Miljöfordon Syd)

Research
(BTH)
Simple?, Effective?, Sustainable?

Steering Group

Governor, Jönköpings Län
Vice Chancellor, BTH
Energy Researcher, LiU
CEO, IKEA Sverige AB
CEO Jönköping Energi Elnät
CEO, Garo
CEO, Enkla Elbolaget
Market Mgr, Oskarshamn Energi
Bisuness Mgr, CGI, Karlskrona
CEO, Hertz Sverige
CEO, Hermibil
Market Mgr, Liljas Personbilar
CEO, Holmgrens bil
Mayor, Älmhult
Mayor, Karlskrona
Mayor Gislaved

GreenCharge - Unique regional mobilization - Project Goals

- CGI
- AB Volvo (Volvo Buss)
- Volvo Technology
- IKEA
- Hertz/Sunfleet
- Affärsverken
- Borgholm Energi
- Bromölla Energi & Vatten
- Eksjö energi
- Emmaboda Energi
- Jönköping Energi
- Karlshamns Energi
- Nybro Energi
- Oskarshamns Energi
- Ronneby Miljö & Teknik
- Växjö Energi
- Växjö Fastighetsförvaltning
- Videum
- Ålem energi
- Blekingetrafiken
- Jönköpings Länstrafik
- Västernorrlands kollektivtrafiknämnd

- Wireless Maingate Solution
- Enkla Elbolaget
- My Eco
- Holmgrens bil
- Liljas bil
- GARO
- Schneider Electric
- Ensto
- Park & Charge
- Chargestorm
- German Solar
- SunDrive
- Innoventum
- Liros Power Solution
- Blekinge Tekniska Högskola
- Linköpings universitet
- Miljöfordon Syd
- Energikontor Sydost
- Mfl

- Ronneby kommun
- Karlskrona kommun
- Olofströms kommun
- Sölvesborgs kommun
- Karlshamns kommun
- Bromölla kommun
- Växjö kommun
- Alvesta kommun
- Uppvidinge kommun
- Älmhults kommun
- Tingsryds kommun
- Ljungby kommun
- Nybro kommun
- Mönsterås kommun
- Emmaboda kommun
- Oskarshamns kommun
- Borgholms kommun
- Jönköpings kommun
- Värnamo kommun
- Eksjö kommun
- Gislaveds kommun
- Habo kommun
- Mullsjö kommun
- Vetlanda kommun

- **Energy Agency**

Länsstyrelserna
Kronoberg
Blekinge
Jönköping
Kalmar

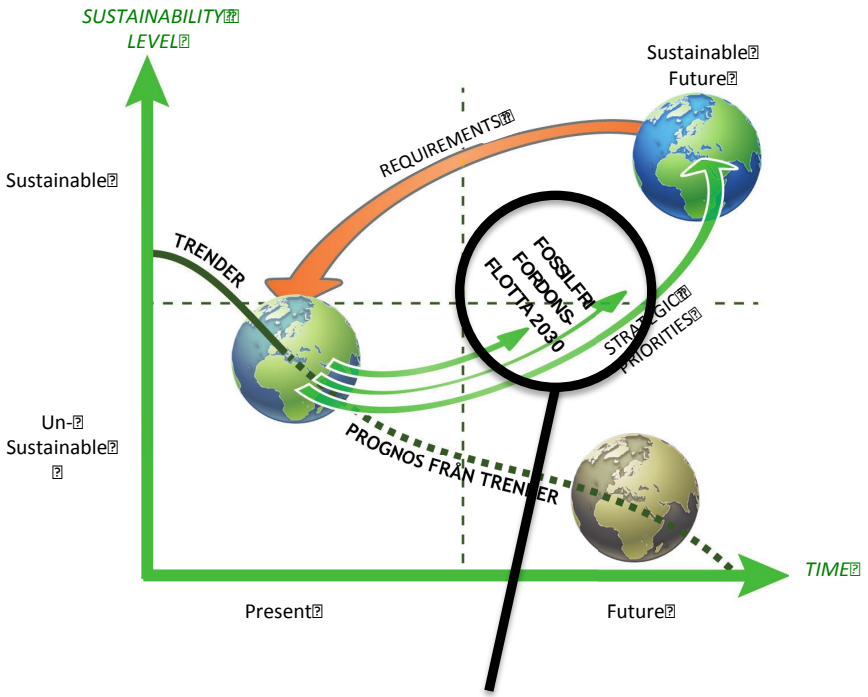
Regionförbunden
Södra Småland
Blekinge,
Jönköping
Kalmar

Landstingen
Jönköping
Kronoberg
Blekinge
Kalmar

Project Goals 2015:
- Sust Approach
- 300+ EVs
- 200+ Charge Points
- 100+ MSEK invest
- Road Map 2030

National mobilization
Meeting the King

GreenCharge – Main Results



GreenCharge Roadmap For Fossil free Trp

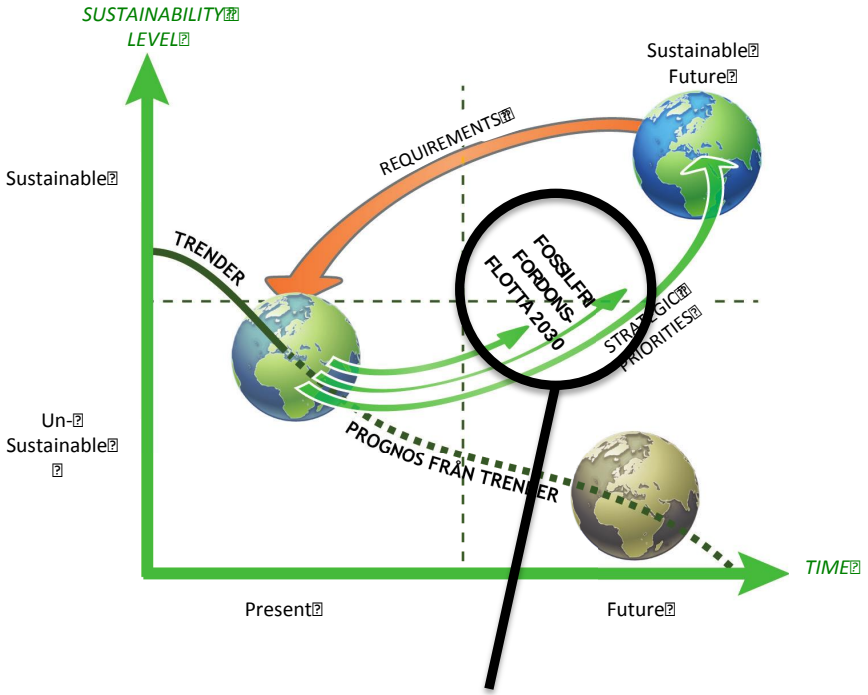
Policy and incentives
- Vision seminars in Karlskrona & Jönköping
- Incentives comparison in 8 countries
- What's in it for sweden? – business case for EVs?

Users and market
- Roadshow 2014: Biggest in sweden
- Lending EVs to municipalities
- Own, lease, car pool or taxi?
- How to promote sales of electric vehicles?

Vehicles
- Buses – part 1: Calculation Electric 20% cheaper
- Buses – part 2: Test Electric bus – 8 cities
- Cars - 24 municipalities: Electric competitive
  Sufficient range
- Batteries or fuel cells?

Charging Infrastructure and energy
- Benchmarking Roadmaps and energy trends
- Fast charging localization
- Service ecosystem for charging?
- Fast Chargers or electric roads?

GreenCharge - Main Results



GreenCharge Roadmap For Fossil free Trp

Policy and incentives
- **Vision seminars in Karlskrona & Jönköping**
- Incentives comparison in 8 countries
- What's in it for sweden? – business case for EVs?

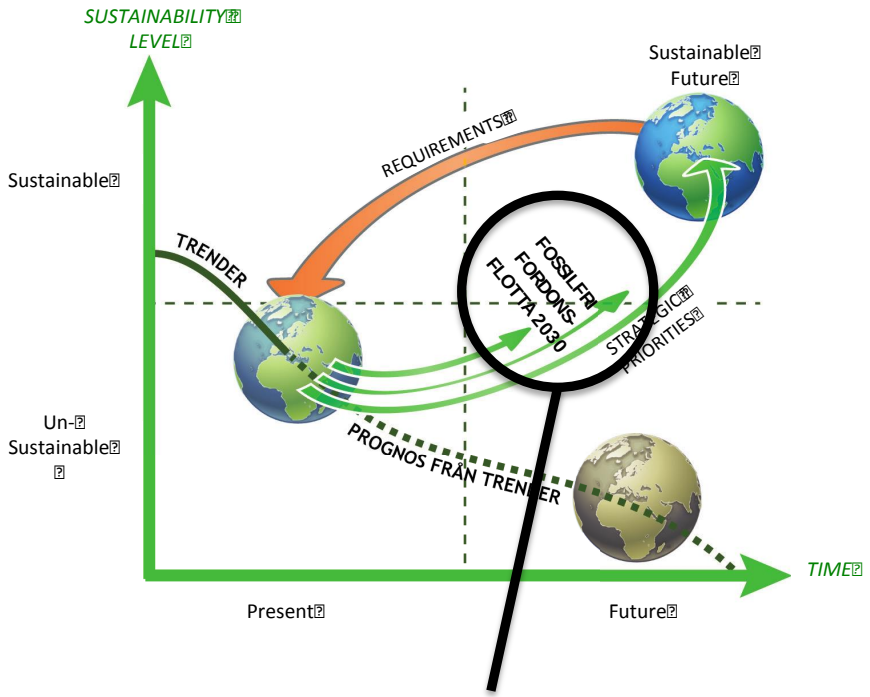
Users and market
- Roadshow 2014: Biggest in sweden
- Lending EVs to municipalities
- Own, lease, car pool or taxi?
- How to promote sales of electric vehicles?

Vehicles
- Buses – part 1: Calculation Electric 20% cheaper
- Buses – part 2: Test Electric bus – 8 cities
- Cars - 24 municipalities: Electric competitive
  Sufficient range
- Batteries or fuel cells?

Charging Infrastructure and energy
- Benchmarking Roadmaps and energy trends
- Fast charging localization
- Service ecosystem for charging?
- Fast Chargers or electric roads?

Vision seminars in Jönköping and Karlskrona

GreenCharge – Main Results



GreenCharge Roadmap For Fossil free Trp

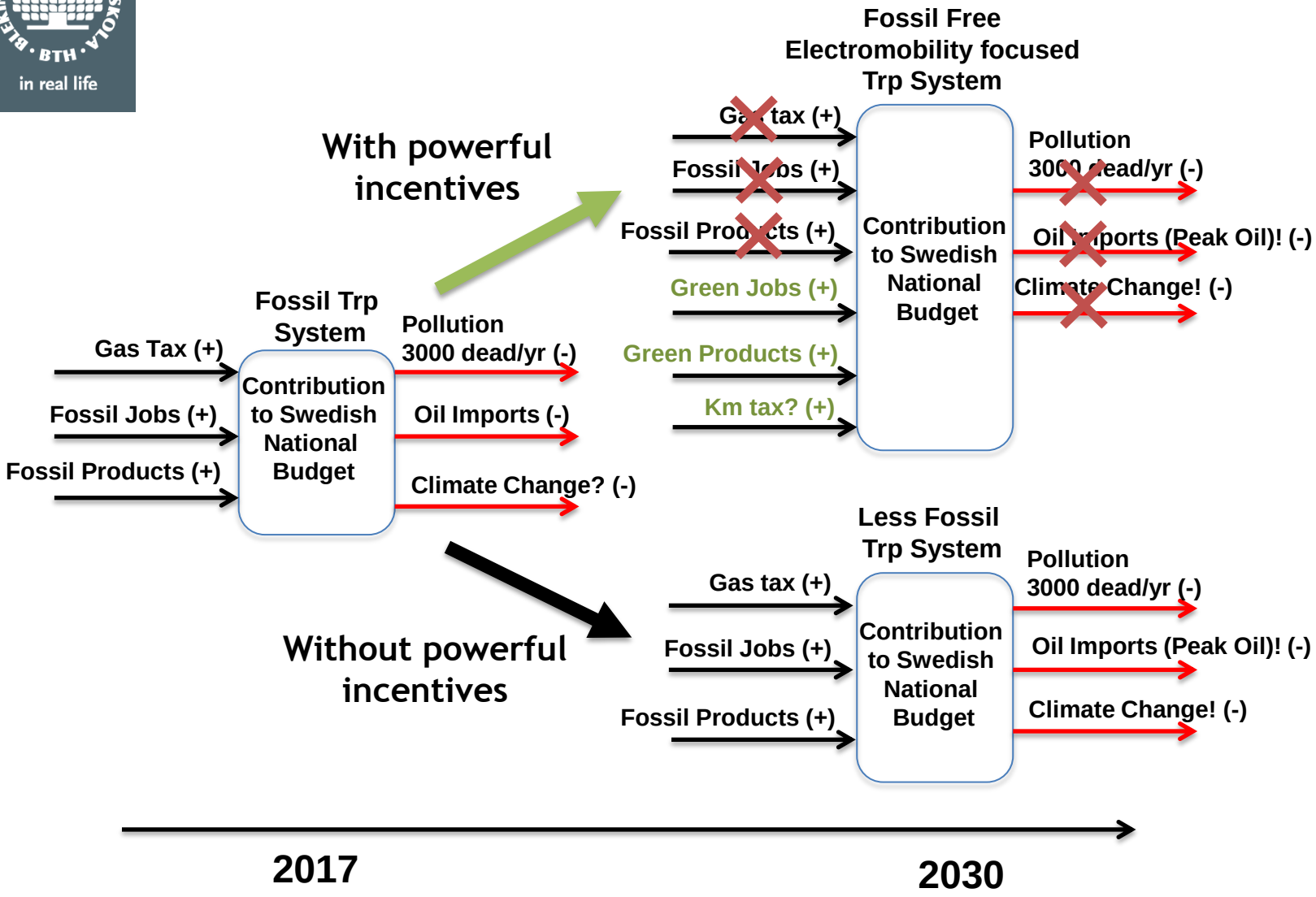
Policy and incentives
- Vision seminars in Karlskrona & Jönköping
- Incentives comparison in 8 countries
- **What's in it for sweden? – business case for EVs?**

Users and market
- Roadshow 2014: Biggest in sweden
- Lending EVs to municipalities
- Own, lease, car pool or taxi?
- How to promote sales of electric vehicles?

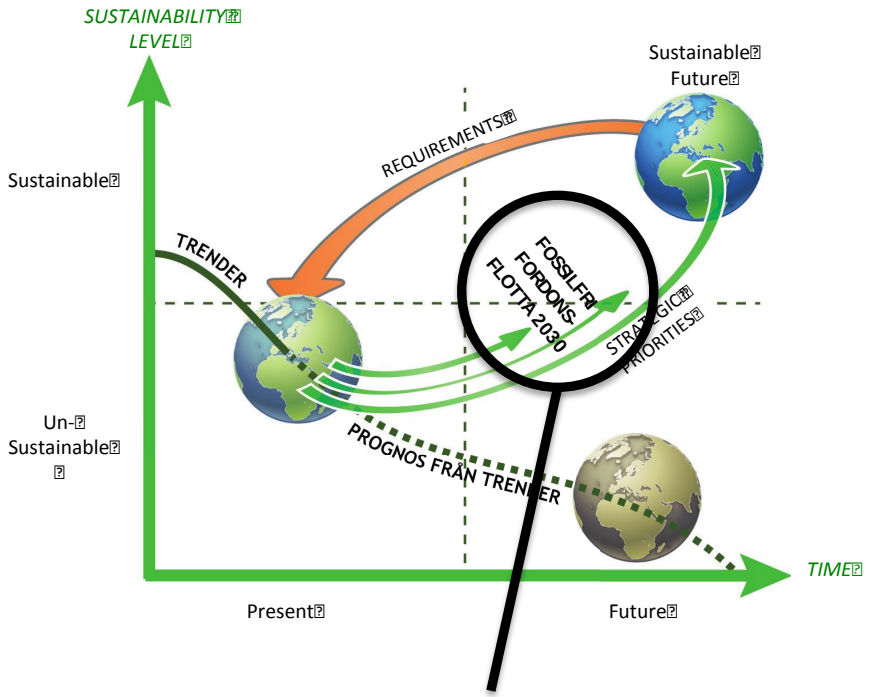
Vehicles
- Buses – part 1: Calculation Electric 20% cheaper
- Buses – part 2: Test Electric bus – 8 cities
- Cars - 24 municipalities: Electric competitive
  Sufficient range
- Batteries or fuel cells?

Charging Infrastructure and energy
- Benchmarking Roadmaps and energy trends
- Fast charging localization
- Service ecosystem for charging?
- Fast Chargers or electric roads?

What's in it for Sweden?



GreenCharge – Main Results



GreenCharge Roadmap For Fossil free Trp

Policy and incentives
- Vision seminars in Karlskrona & Jönköping
- Incentives comparison in 8 countries
- What's in it for sweden? – business case for EVs?

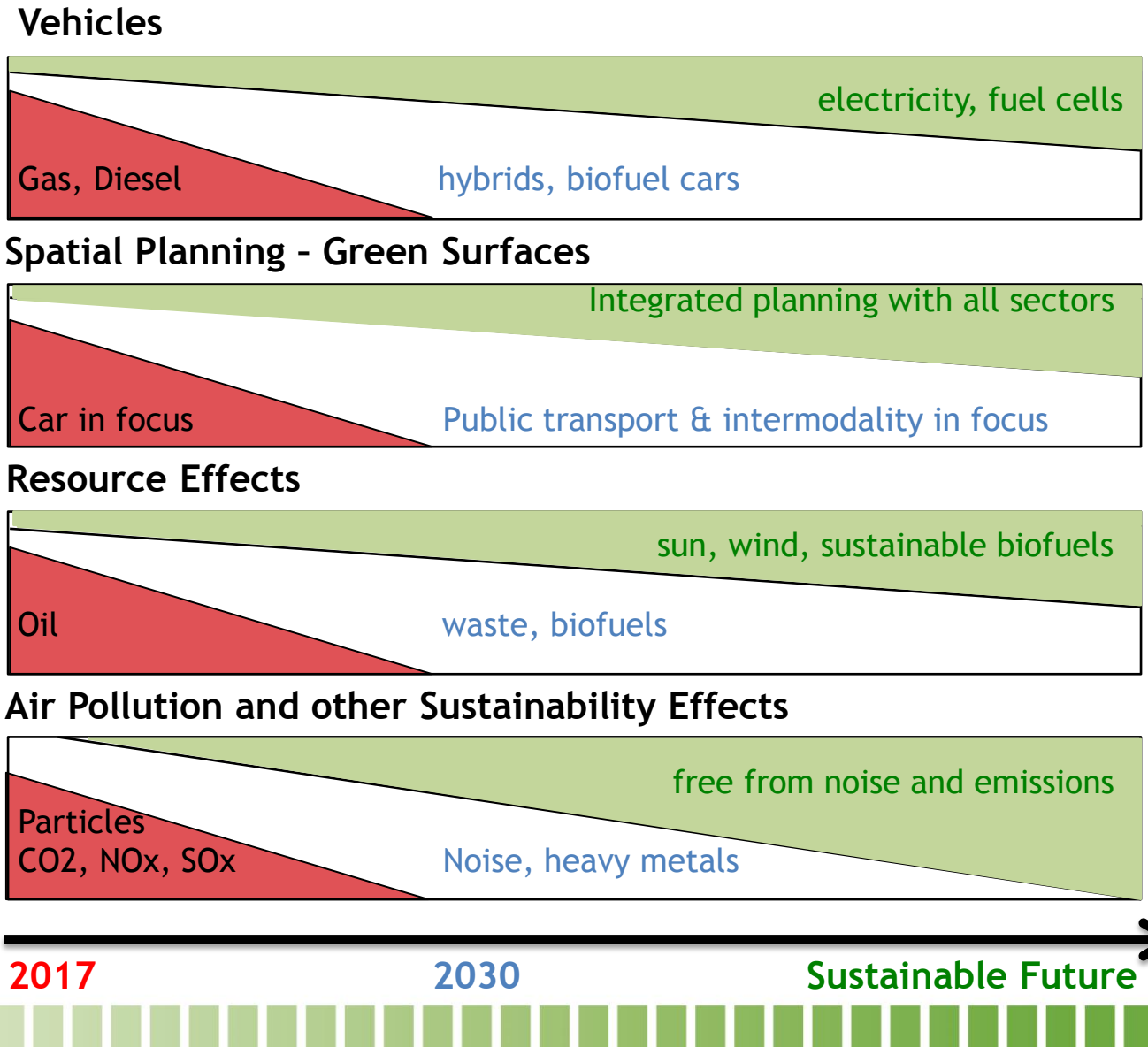
Users and market
- Roadshow 2014: Biggest in sweden
- Lending EVs to municipalities
- Own, lease, car pool or taxi?
- How to promote sales of electric vehicles?

Vehicles
- Buses – part 1: Calculation Electric 20% cheaper
- Buses – part 2: Test Electric bus – 8 cities
- Cars - 24 municipalities: Electric competitive
  Sufficient range
- Batteries or fuel cells?

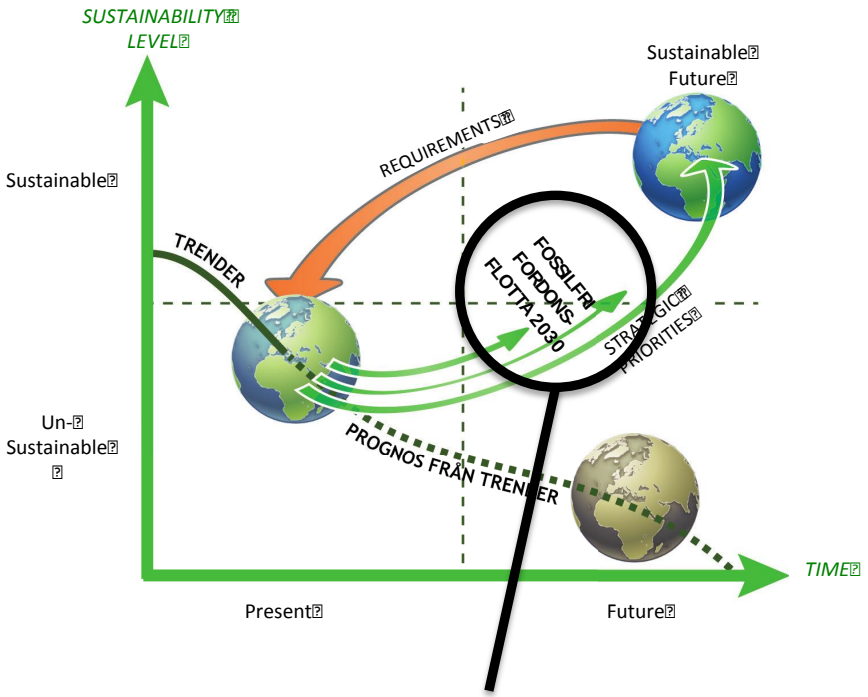
Charging Infrastructure and energy
- Benchmarking Roadmaps and energy trends
- Fast charging localization
- Service ecosystem for charging?
- Fast Chargers or electric roads?

ROADMAP?

Road Map – Sustainability Transition



GreenCharge – Main Results



GreenCharge Roadmap For Fossil free Trp

Policy and incentives
- Vision seminars in Karlskrona & Jönköping
- Incentives comparison in 8 countries
- What's in it for sweden? – business case for EVs?

Users and market
- Roadshow 2014: Biggest in sweden
- Lending EVs to municipalities
- Own, lease, car pool or taxi?
- How to promote sales of electric vehicles?

Vehicles
- Buses – part 1: Calculation Electric 20% cheaper
- Buses – part 2: Test Electric bus – 8 cities
- Cars - 24 municipalities: Electric competitive
  Sufficient range
- Batteries or fuel cells?

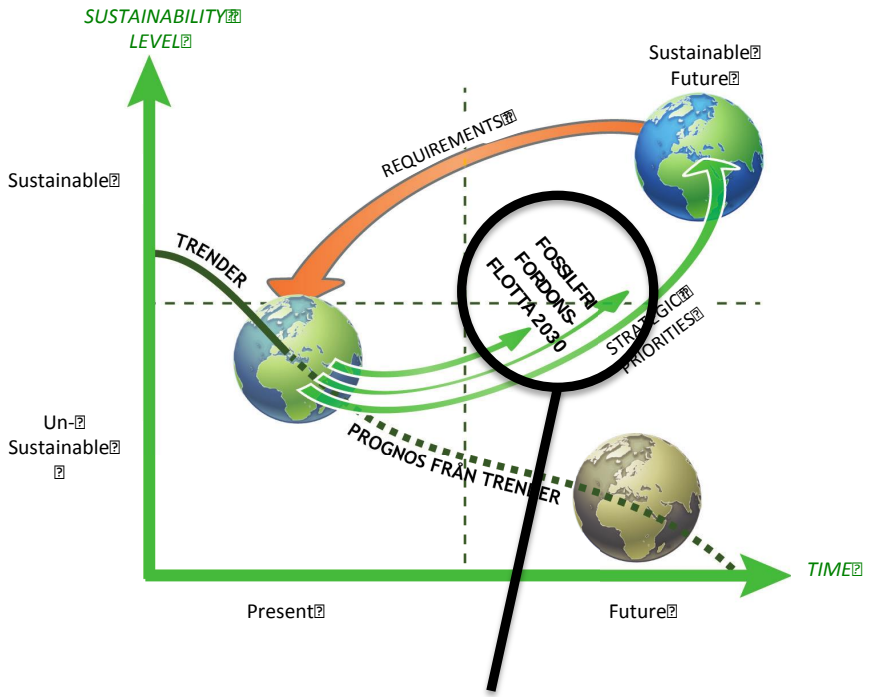
Charging Infrastructure and energy
- Benchmarking Roadmaps and energy trends
- Fast charging localization
- Service ecosystem for charging?
- Fast Chargers or electric roads?

THANK YOU!

Henrik Ny
PhD, Research Team Leader
Sustainable Transport and Energy Systems
Department of Strategic Sustainable Development
Blekinge Institute of technology
Henrik.Ny@BTH.se
www.bth.se/sustaintrans
+46 0701 43 51 31

EXTRA MATERIAL

GreenCharge – Main Results



GreenCharge Roadmap For Fossil free Trp

Policy and incentives
- Vision seminars in Karlskrona & Jönköping
- Incentives comparison in 8 countries
- What's in it for sweden? – business case for EVs?

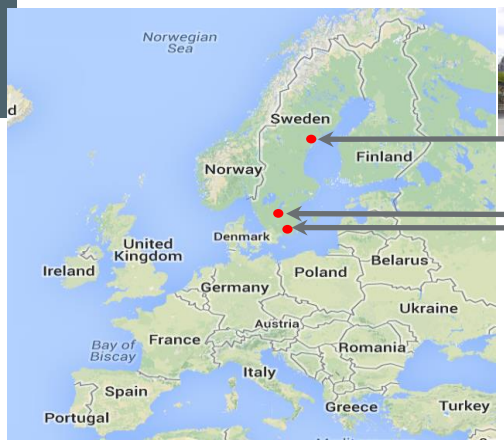
Users and market
- Roadshow 2014: Biggest in sweden
- Lending EVs to municipalities
- Own, lease, car pool or taxi?
- How to promote sales of electric vehicles?

Vehicles
- **Buses – part 1: Calculation Electric 20% cheaper**
- Buses – part 2: Test Electric bus – 8 cities
- Cars - 24 municipalities: Electric competitive
  Sufficient range
- Batteries or fuel cells?

Charging Infrastructure and energy
- Benchmarking Roadmaps and energy trends
- Fast charging localization
- Service ecosystem for charging?
- Fast Chargers or electric roads?

Theoretical Bus Study

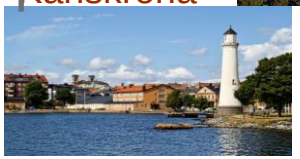
Which bus type is preferable for Swedish Medium sized Cities?



Sundsvall

Jönköping

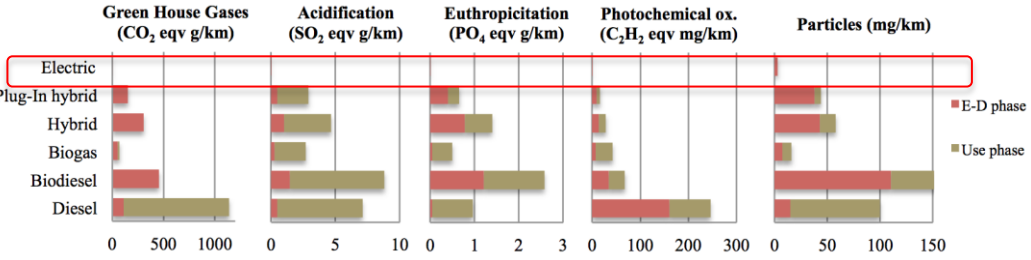
Karlskrona

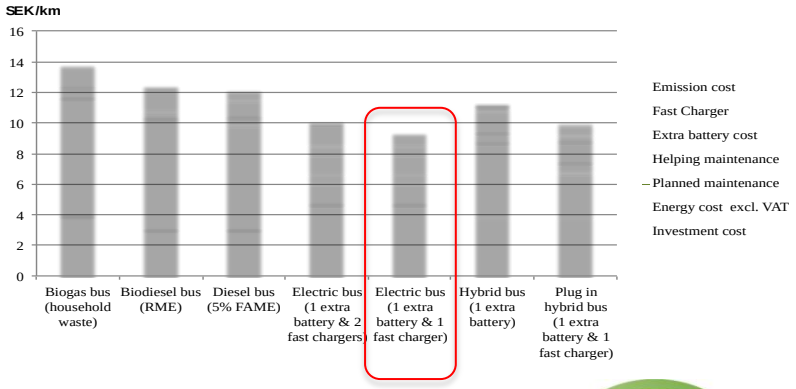


Comparison for Biogas (Household waste), Biodiesel (RME), Diesel, Hybrid, Plug-in, and Electric bus

5 buses, 93000 km/year, 8 years

Result: Sustainability potential & economic potential

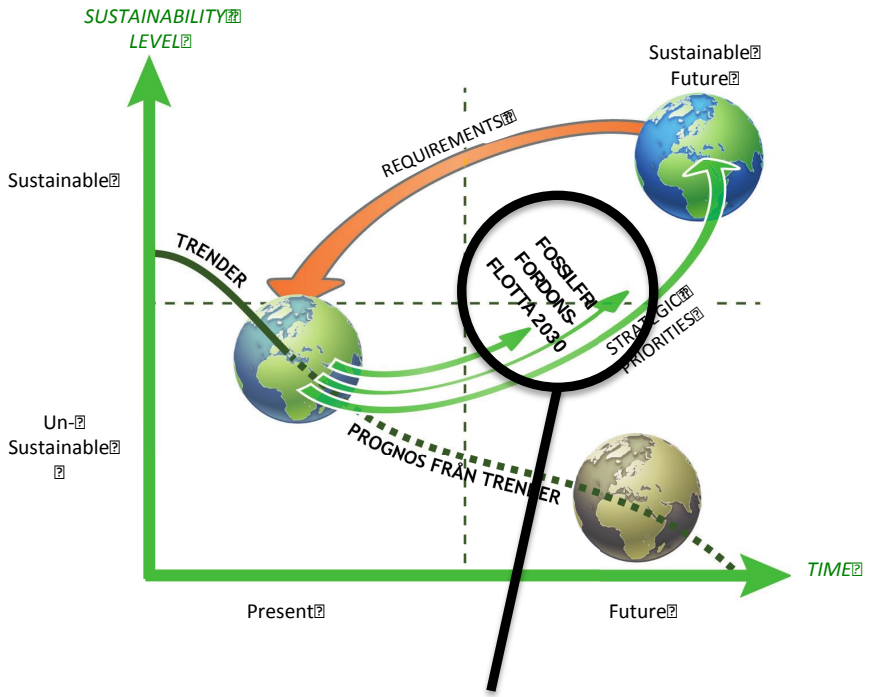




Conclusion:

- How balance ecological sustainability vs economical sustainability → use green electricity
- Electric bus would reduce about 90% emissions
- Electric bus is 24% cheaper than diesel bus

GreenCharge – Main Results



GreenCharge Roadmap For Fossil free Trp

Policy and incentives
- Vision seminars in Karlskrona & Jönköping
- Incentives comparison in 8 countries
- What's in it for sweden? – business case for EVs?

Users and market
- Roadshow 2014: Biggest in sweden
- Lending EVs to municipalities
- Own, lease, car pool or taxi?
- How to promote sales of electric vehicles?

Vehicles
- Buses – part 1: Calculation Electric 20% cheaper
- **Buses – part 2: Test** **Electric bus – 8 cities**
- Cars - 24 municipalities: Electric competitive
  Sufficient range
- Batteries or fuel cells?

Charging Infrastructure and energy
- Benchmarking Roadmaps and energy trends
- Fast charging localization
- Service ecosystem for charging?
- Fast Chargers or electric roads?

Electric bus test 'in real life'

Is electric bus preferable to use in public transport?

6 cities & 2 rural in south Sw.

Winter 2014-15 (Dec-March)

Ebusco 2.0 (311kWh = 300 km)

Depot charging

Diesel/Gas heater

Real public transport

Source: http://www.barometern.se/kalmar/tysta-elbussar-imponerade-pa-passagerarna/ Photo: Stefan Nilsson

? Energy use : 0,96 kWh/km in cities & 0,88 kWh/km in rural areas =>350 km range

? Noise : Similar to diesel and hybrid buses, but -4dB during acceleration

? Opinions : ☺ passenger, drivers, stakeholders. Uncertainties need to be included

? Charging : Great charging possibilities @ each tested line

- Yes, electric buses are preferable to use in public transport if new green electricity and biogas is used