Nordic EV Summit

AN EVAS PERSPECTIVE

A meeting of nations,
An exchange of experiences.

Costa Rica, Belgium, Norway, Sweden, Denmark, New Zealand, USA, Scotland

Commonality of problems

- Charge point reliability
  - How do we compare?
    - Benchmarking required
    - Metrics to be developed
    - Data to be available
    - Site redundancy
  - Charge point accessibility
    - ICEing, a universal problem
      - National laws
      - Local laws
- Charge point comms
  - Are we ahead of the game?
    - Whitelist
    - Others?

Expanding on Interactions

- Informal international working group established
  - Benchmarking
  - Problem solving
- Marketplace comparisons

- Further meeting with Costa Rica already has taken place in Edinburgh

Utility differences

- USA
  - Utilities welcome the extra consumption, returning revenue after efficiency programmes.
    - Grid already built for higher loads
    - High availability of off street parking
  - Nordics
    - Grid built with additional winter loads in mind (block heaters)
    - New developments designed with EV charging a consideration.
  - UK
    - No network company has a defined policy in place. Yet
    - Opportunity to influence toward a common standard
      - For new networks
      - For Smart Charging on all networks. (Supplier agnostic)

Utility Differences

- New Zealand
  - Market is already more dynamic
  - 85% renewables
    - Tariffs:
      - Domestic spot pricing
      - Innovative domestic tariffs with smartphone apps
        - Price changes notified to customers. (30 minute periods)
- Costa Rica
  - Starting from scratch
  - Inherently weaker grid
    - 98.1% renewables
    - Intelligent charging from the outset?
    - A lesson for Scotland?

EVA Scotland Development

WHAT HAVE THE NORWEGIANS EVER DONE FOR US?

How do Norsk Elbilforening see themselves

- As an advocate for EVs
- They do NOT point fingers or blame
- Adding value, at all levels
  - Providing services: Research, surveys.
  - Supporting purchasers, in part by supporting sellers.
- As support: helpline, info pack, and website
- They influence.
  - Policy
  - Charge networks
  - Lawmaking

Growth needs an offer

The EV Box

Adding value:

Charging Disk

- Shortcode service

Guide

Who is the value for?:

- User
- Dealer
- CPS

Third Party Services

Insurance offerings

- Tailored policies
- Extended Battery Warranty
- Breakdown Cover
- Utility offerings

All tied to membership

Route planning app?

Provision of research services

Expanding the market

EVA Scotland started as a body for drivers

It can also provide services to fleets, local authorities, government and associated industries.

Ultimately these are all to support the users of EVs, by offering policy guidance and influence to the above.

We need to be co-ordinator, disruptor, mediator and arbitrator for ALL the above

Charge Point Network Operators

HIGH LEVEL COMPARISON

Tariff Comparisons: Commercial Operators

ChargeNet.NZ

Rapids: 25c/minute & 25c/kWh

Fast: Free or 40c/kWh

Drives behaviours at Rapid units to prevent unnecessary dwell periods, enhancing availability.

Fortum

Rapids: 2.5NOK/kWh

Fast: 0.40NOK/minute

CLEVER

Rapid £83/month Unlimited

USP 1:Free tow if charger failed

USP 2: Rebate on energy used at home with CLEVER wallbox

From 70p/kWh Tourist pre-paid. No tow.

Start Charge – ChargeNet NZ - Google Chrome

Secure | https://charge.net.nz/my/station/

Apps | Fire Wood | Broadlea | Wool spinning wheels | Eterra | http://www.greenflee | Used Car for Sale - A | Imported From IE | Section 4 | IQGlass Sc | Shopping Basket | Ce | Other bookmarks

ChargeNet.nz

Start Charge | ChargeNet Map | News | About | Contact | Support | My ChargeNet

McVicar Rd (Napier-Taupo Highway)

Directions

ABB-1 (Type 2 Socket)	0.40 / kWh	Start Charge

Napier (Dickens Street Car Park)

Directions

ABB-1 (Type 2 Plug)	0.40 / kWh	Start Charge

Little River (Train Station)

Directions

ABB-1 (Type 2 Plug)	Free	Start Charge

ChargeNet.nz
Electric Vehicle Charging Network

MAIN MENU

› Start Charge

Type 2 AC

From outside NZ

QUICK LINKS

Home Page
FAQ
What We Do
Where We Are

MY CHARGENET

Registration
Activate Station
RFIDs
Order RFIDs

chargenet.nz-logo....png

Show all

Other Unique Selling Point Offerings

- Reservations
  - Using the app to reserve a charger on approach. For a price.
- Time of use pricing
  - Reflect utility spot pricing to the charger to incentivise behaviours
- Interoperability with neighbouring and overlapping networks
  - Transparent billing back office

Utility Interactions with EVs

WHAT THE NORDICS HAVE DONE

Analysis (and pilots)

- 5M EVs results in an increase in power of 6%
  - Only **1.6%** with smart charging
    - 80% of EVs in **three** cities
    - 3.8 cars per public chargepoint. (Indicator metric, where are we?)
    - V2G is likely to become a major market in cities.
- Soft and hard control of charging required.
  - Energy storage will play a critical role
  - Embedded generation will play a critical role
- Policy will be very complex, with grid services, aggregation and demand side response needing long term certainty.
  - Data services need to right before mass market.
  - Users are interested, but investment is likely to be commercial first.

Smart Charging

HOME AND AWAY

At home, at work and on the road

- Priority/price compromise
  - Higher priority users don't pay the utility the difference, they subsidise users who accept lower charge rates to accommodate their hurry.
    - Income stream is a flat rate, easy to project figures.
  - Business model, network operators take a cut.
  - Demand side management for utilities, interrupted/interruptible charge sessions attract lower unit rate.
    - SSE have already identified that a customer centric approach is critical
- Back office products already exist
  - Virta
  - EVBox
  - GreenFlux
  - Smart:Liv many others. Can be integrated into network management.

Aligning charge profiles with grid generation and demand profiles

- Multi-stranded approach
  - Fiscal, low tech
    - Smart billing
      - Time of Use
      - Spot Pricing
      - Rebates
  - Fiscal, higher tech
    - Demand side response charge control
      - At the meter
      - At the charger
  - Move EST funded chargers to controllable smart units NOW?

Car Manufacturers

A TALE OF TWO CAMPS

When Stefan met Gareth

Stefan Niemand, Audi

- The demand isn't there yet
  - We have to be
- The market will not really respond until 350kW charging is achieved
  - By demanding it from suppliers, they will try and develop it.
  - Comparing EV to ICE in terms of fuelling.
- Autobahn requirements!
- Tesla did it wrong.
  - Closed charge infrastructure is not the way to go. CCS is better.
  - Tesla may not differ on this opinion. In an empty space, something was needed, so they built it.

Gareth Dunsmore, Nissan

- Only sees growth and expansion
  - Whole Ecosystem model
- Other manufacturers promise
  - NISSAN deliver
- Competition is welcome
- Consumers need to rethink their understanding of their needs
  - Range, cost against actual journeys. Buy only what you need regularly. Rent a longer range car if you need too. (Mobility as a Service)
- Adding cost (350kW charging) will not bring EV fully to mass market, the consumer has to be more pragmatic about change.

Other Electric Vehicles

BIG, BIGGER, SMALL

Buses

- BYD
  - Public must accept that environmental improvement has a cost.
    - Part of the solution is to spread the cost around a larger group, then no-one pays more.
    - Whole system subject to iterative improvement. Things will change.
      - Routes and running will adapt to the technology
- Linkker
  - Lightweight Finnish city buses
  - Opportunity panto charge
  - Business case is long term/whole ecosystem

Tide

Total Cost of Ownership Higher for E-Bus
-Takes inadequate account of rising fuel costs, LEZ costs

Trondheim contract has 35 electric buses, approx. two pantograph charge stations per route.

Key takeaways:

- Less Noise
- High Efficiency
- Low cost energy
- Clean and renewable energy

Increase in bus riders is essential to the economic development of electric bus routes.

Public Transport in Perspective

Electric bus adoption must live alongside final mile solutions including LEV and MaaS to become mainstream.
Main parties see risk sharing critical on the early path.
Technology advances may re-write this.

Bus Standards

- Risk Sharing
  - Infrastructure needs to be operator independent: shares costs, improves economic case.
  - Opportunity charge delays must be accommodated by regulatory frameworks. Timetabling will require more overlaps.
  - Single biggest challenge is infrastructure
    - Installation (including network connections)
    - Maintenance
    - Security (Vandalism) Risk

Ships and Boats

ELECTRIC FERRIES, HYDROGEN HURTIGRUTEN

simply successful

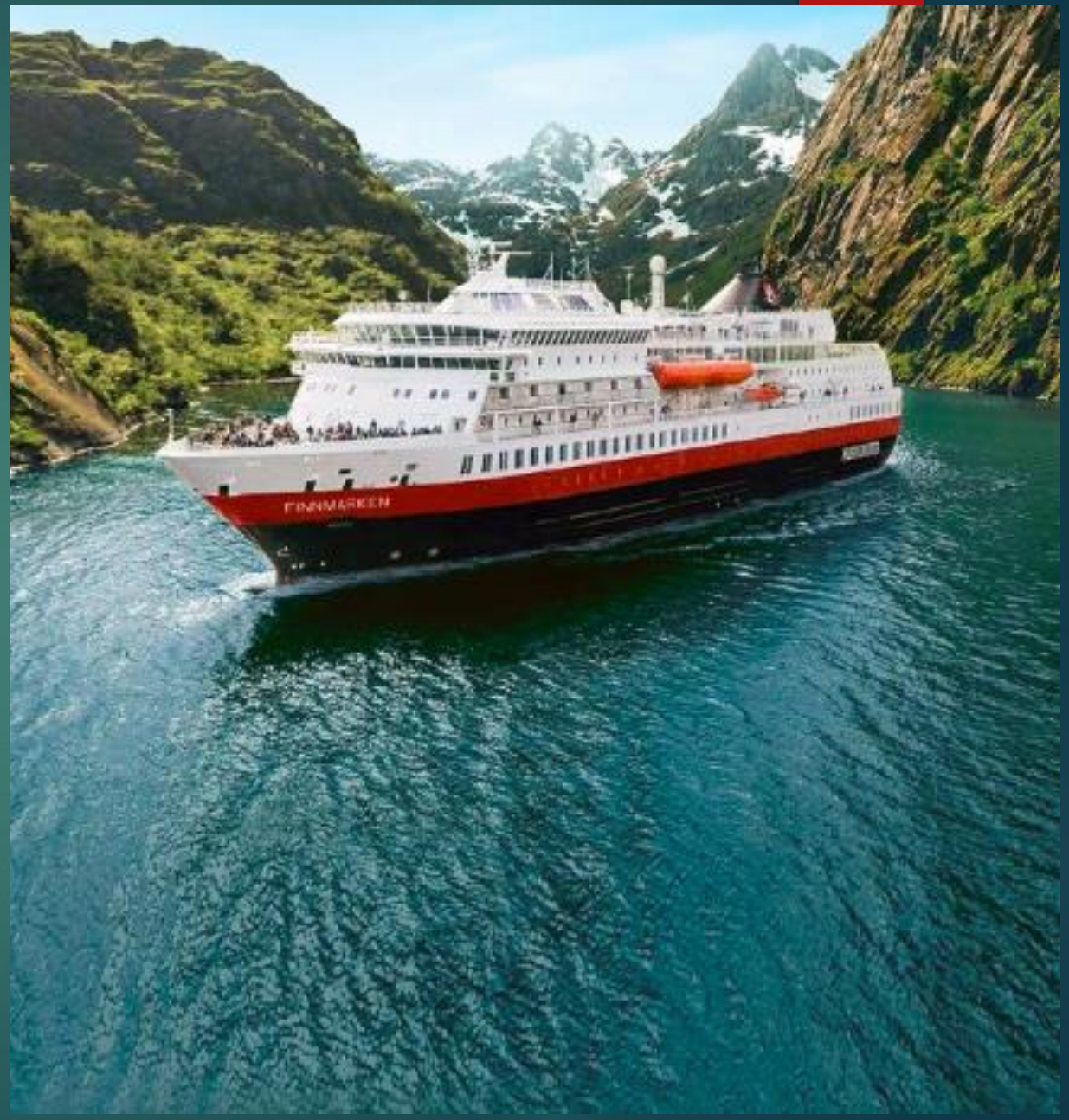
- Environmental impact significantly reduced
  - Significant numbers ordered after trials
  - Very high power charging, robotic charge connection required at ports
- Small ferry achieved carbon neutral state at 4 months!
- Electric high speed ferries on the way
  - Hybrid high speed ferries too heavy
- Electric workboats for fishfarms
  - EVA Scotland seeks the development of incentives for fish farms to adopt EV workboats
    - Reduces the storage of fuel on site
    - Reduces carbon footprint of farming
    - Potentially significant cost saving
  - Look to hydrogen for larger commercial craft.

Hurtigruten

Cruise expeditions

Particular view to environmental impact of coastal cruises in the arctic circle.
BEV is not viable, for obvious reasons
Hydrogen PHEV is more attractive: ideal application.
First Diesel Hybrid cruises next year.

Scottish Connection:
These ships call in Orkney, Shetland, if H2 is fuel, then possibility to increase stops, utilise same technology on island ferries.



Electric Flight

NORWAY'S AMBITIONS

Internal flights to be electrified

- Nobody said it would be easy.
  - Initial target routes of around 100km (allows for diversion and delay)
  - All internal flights to be EV by 2040
  - Development of full EV aircraft
    - Longer routes: Serial Hybrid aircraft (3+1 engine).
      - One Electric turbofan, onboard batteries and APU to power.
      - Airbus EfanX
- EasyJet
  - Fully electric widebody within ten years
    - High level of redundancy, 16 motors, better than just 2

Scottish Flights

- Inter-island routes
  - Range assessment for island hopping
  - Turnaround times (opportunity charge)
- Intercity domestic routes
  - Faster than the train? Premium offering?
  - Avoid major airports: so Cumbernauld, Dundee, Inverness, Wick
    - New dynamic
    - New routes
    - Attract R&D
    - Integrate with MaaS

Norwegian EV Policy

- It is now a **Right** to charge at home.
  - Clarifies position for private landlords to facilitate charging in apartment car parks and flatted developments:
    - Do we need this? YES
  - The tipping point was 10% of EVs in a block forcing landlords to change.
    - Inclusion in law will force as a minimum the installation of enabling hardware.
      - Impacts
        - Utilities need to be notified, as a statutory obligation
        - Network connection costs will rise
          - Can be mitigated with smart charge at installation
        - Will further aid in increasing the uptake of EVs. If you build it, they will come.

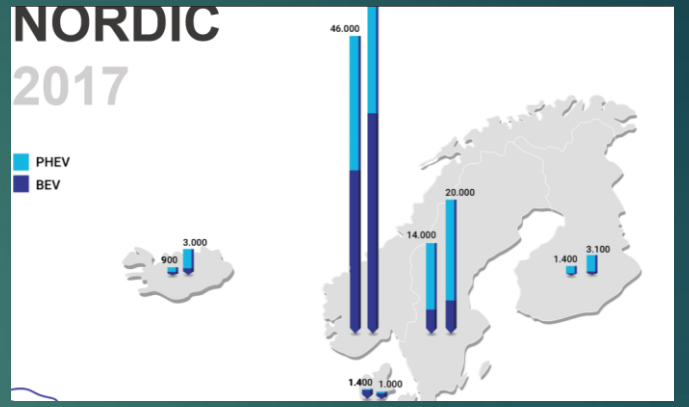
EV Incentives: When not to stop?

Of the Nordics, only Denmark showed a year on year drop in sales:
Why?
- Incentives removed
  - Demonstrates market not yet mature

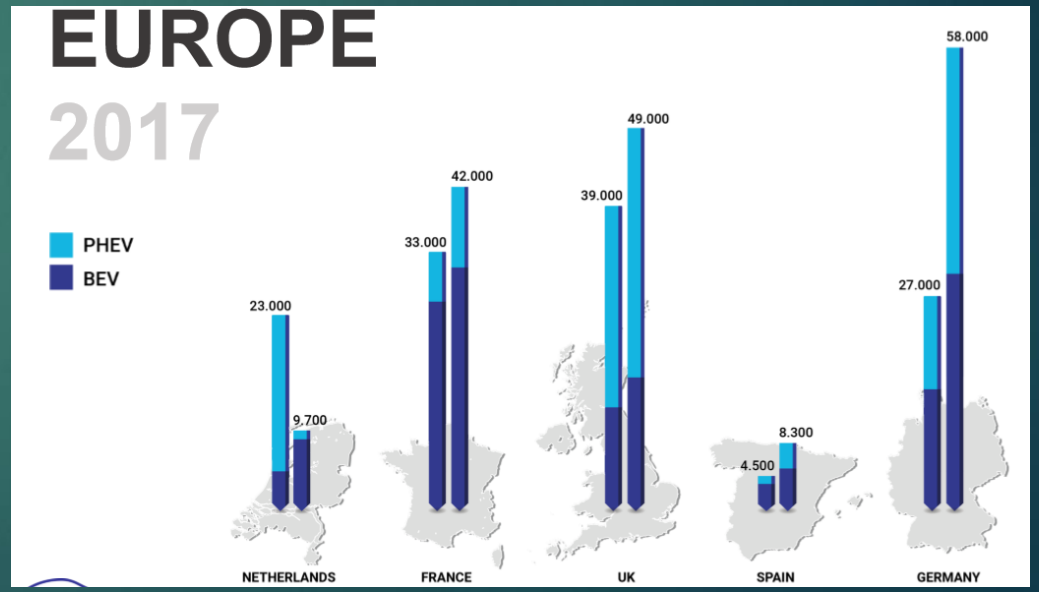
Solution?
- Incentives re-instated

Create more incentives, long and short term, to sustain growth
- Bus Lane access?
- Ferry subsidies?
- Free city centre parking?
- Free Park and Ride Charging?
- Zero cost permits in TMZs?

Maintain existing incentives as long as reasonably practical.



Norsk Elbilforening



Light Electric Vehicles & Mobility as a Service

A Nordic Vision,

Development of a mobility service as an alternative to taxis and private cars within the city.

- Culture change for many users.
- Includes 'float cars' (Car Clubs)
- Requires integration into urban and suburban spaces design, building design and transport design
- Not for everyone
- Health benefits, available on prescription!

MaaS: already "normal"

Next level is normal. The it's not for me groups who it **is** for.

Electric Vehicle Association Scotland