

Electric Vehicles and Strata Complexes

Jim Hindson P.Eng (ON)

April 2, 2017

Straw Poll – Show of hands

- 1) Your total average daily drive (commute and errands) is
 - a) More than 50 miles (80 km) per day?
 - b) Less than 50 miles (80 km) per day ?

- 2) Do you take your vehicle to the mainland (on average)
 - a) More than once a week ?
 - b) About 1 - 4 times a month ?
 - c) About 1 - 12 times per year ?
 - d) (Almost) never ?

What is an Electric Vehicle (EV) ?

Types of Electric Vehicles

HEV (Hybrid “Electric” Vehicles)

These vehicles use an electric motor for start/stop functions and low speed driving, and are not Electric Vehicles (EVs)

Examples



Toyota Prius Hybrid



Toyota Camry Hybrid

All “Hybrids”

What is an Electric Vehicle (EV) ?

PHEV (Plug-In Hybrid Electric Vehicles) – Transition to full electric

PHEVs can be plugged in and are capable of highway speeds in electric-only mode.

Examples



Ford Fusion Energi



Chevrolet Volt



Chrysler Minivan PHEV

BEV (Battery Electric Vehicles)

An electric vehicle powered by an electric motor, with the power exclusively stored in batteries.

Examples



Chevy Bolt



Kia Soul EV



Nissan Leaf



BMW i3



Tesla Model X

Why Electric?

The Environmental Impacts of Fossil Fuels

In Canada, oil is predominantly mined



Alberta Tar Sands

Why Electric?

then boiled



then transported

Why Electric?



and finally burned in
the atmosphere

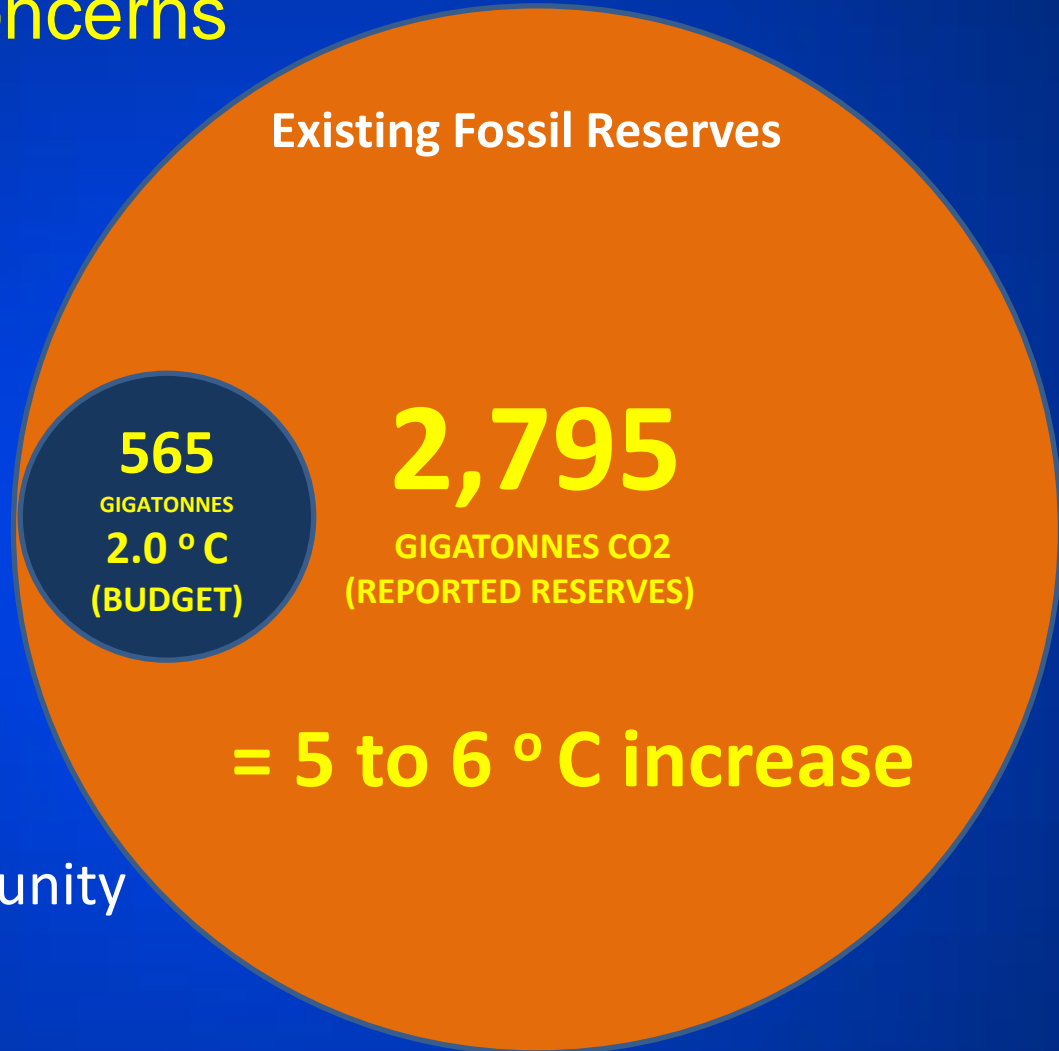
The average Internal Combustion Engine vehicle emits 6 tonnes of CO₂ per year

What is Driving EV Sales?

Climate Change Concerns

To hold the temperature increase to 2.0 degrees we can only emit another 565 gigatonnes of CO₂

The transportation sector represents a major opportunity to reduce CO₂ emissions



What is Driving EV Sales?

Pollution Concerns

Internal Combustion Engine (ICE) vehicles



Average ICE Vehicle (per year)	
Gasoline	2,270 litres (1.8 tons)
CO2	6 tonnes
NOx	40 lbs
VOCs	2 lbs
PM	Particulates

100% Electric vehicles



Electric Vehicle (per year)	
Electricity	4,300 kWh
CO2 (Carbon Dioxide)	0
NOx (Nitrous Oxides)	0
VOCs (Volatile Organics)	0
PM (Particulates)	0

What is Driving EV Sales?

The Simplicity of the Technology



Engine Compartment (Gas)

Engine compartment is filled with complex systems



Power Compartment (Electric)

- No transmission or clutches
- No pistons, rings, rods, valves or camshafts
- No drive belts for A/C , steering, or alternator
- No sparks plugs, fuel injectors, or turbos
- No timing chain
- No Engine Control Module or sub modules
- No oil system, pollution controls, or sensors
- No headers, catalytic converters, mufflers or tailpipe

300 + moving parts to the drive shaft



- Only 3 moving parts to the drive shafts

What is Driving EV Sales?

Operating Cost

- 10 - 20% the cost of gasoline per km
- no oil changes
- brake work is rare (160,000 km plus)
due to EV regenerative braking
- no regular maintenance

SAVINGS OF \$1,500 - \$4,800 per year

What is Driving EV Sales?

Purchase Cost (entry level)



New : \$32K – \$42K



Used : \$12K – \$25K

- Short term purchase incentives in BC of up to \$11,000



Up to \$5,000 off purchase or
lease of an electric vehicle
and



\$3,000 - \$6,000 off the purchase or lease
of a new or used electric vehicle if old
vehicle is scrapped

The Market for EVs on Vancouver Island

- Island vehicles average travel is less than the mainland
- Major island population centres are less than 300 km apart
- Largest BC City is just a ferry ride away
- Businesses can also go electric
 - save operating costs
 - project a “Green” image to their customers

The Disruptive “S” curve

Disruptive technologies



Camera market disrupted
by smart phones



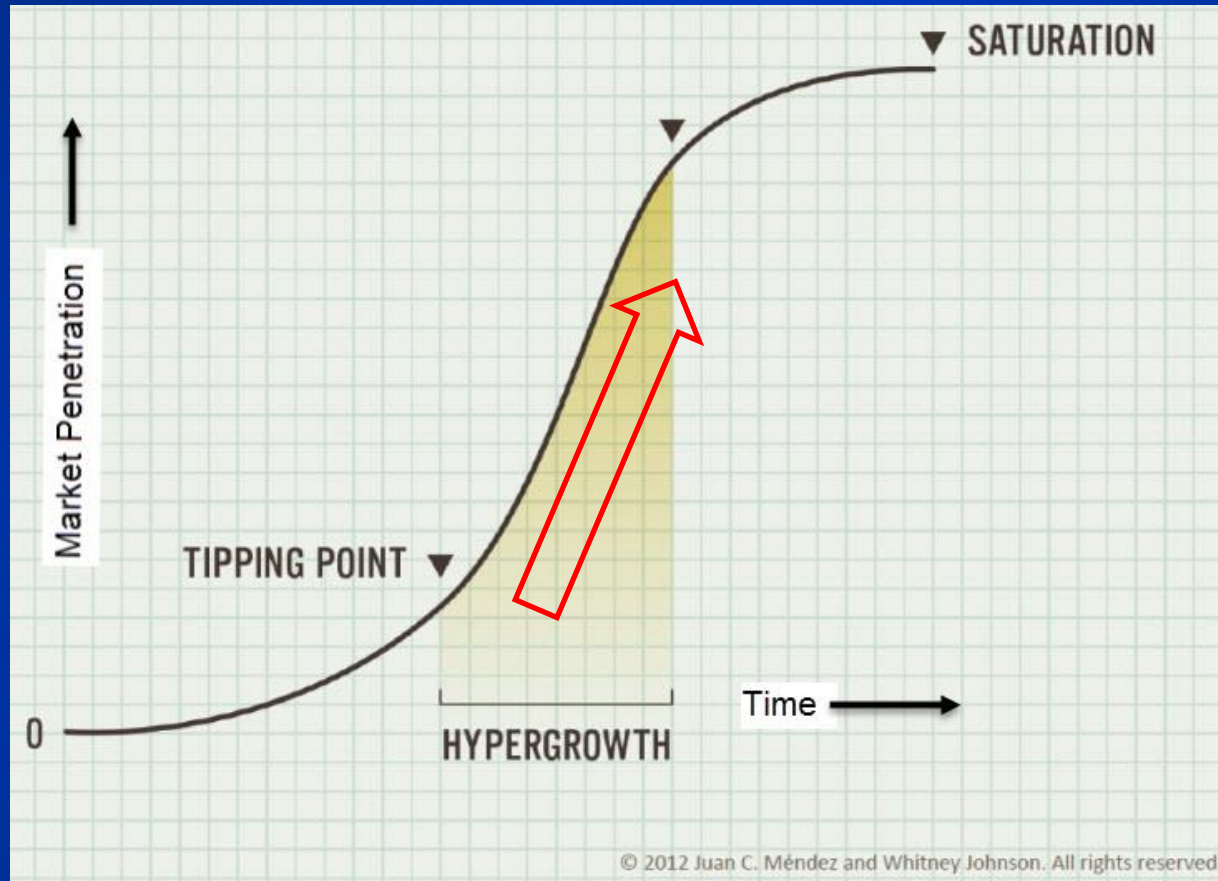
CD market disrupted
by thumb drives



TV market disrupted
by flatscreens



The Disruptive “S” curve



A slow initial adoption rate followed by very rapid growth
- Even though the disruptive product is more expensive

The Disruptive “S” curve

Disruptive technology growth is usually heavily underestimated

In 1980 Motorola Predicted that by the year 2000 there would be 900,000 cell phones in operation

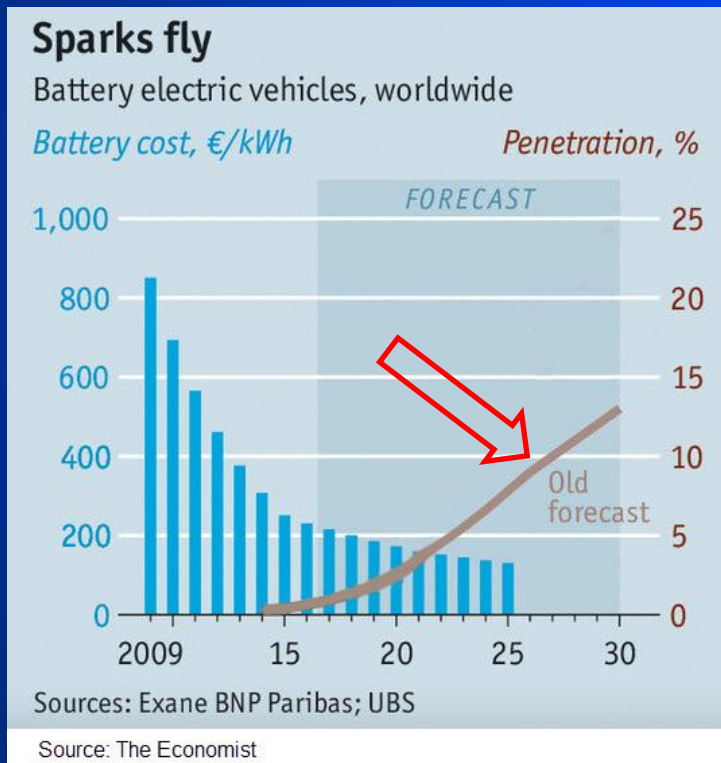
In 2000 there were 140 million cellphones in operation and they were increasing by 900,000 every three days (the prediction was off by 150 times)



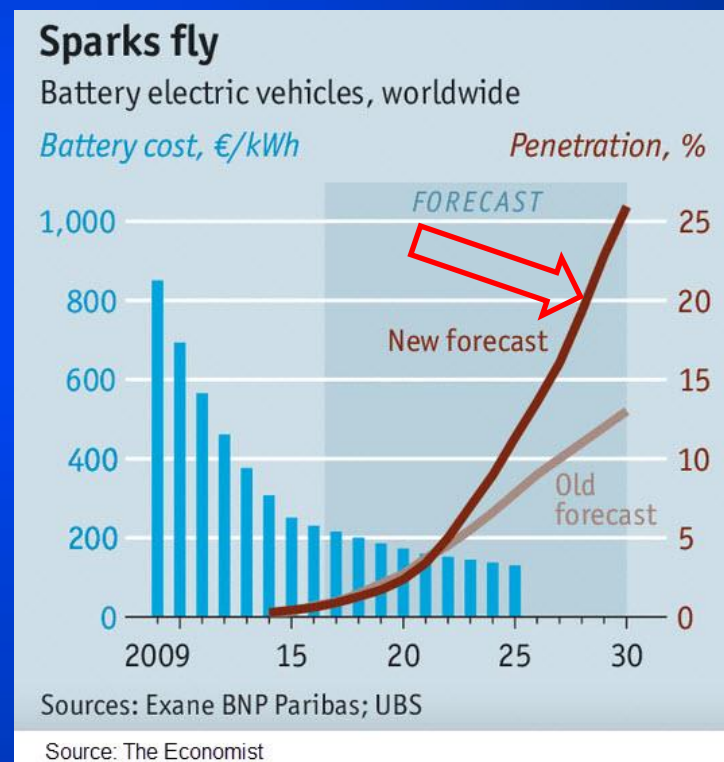
The EV Disruptive “S” curve

Electric Vehicles are also a disruptive technology:

- a slow initial adoption rate followed by very rapid growth



Original Forecast



New Forecast

The EV Disruptive “S” curve



It's over

- **Internal Combustion Engine (ICE) vehicles are on the way out**

All major vehicle manufacturer's have announced commitments and production plans for electric vehicles

Audi

Ford

Kia

Toyota

Bentley

General Motors

Mercedes

Volkswagen

BMW

Hyundai

Mitsubishi

Volvo

Chrysler

Honda

Nissan

* Availability of makes and models is currently subject to manufacturer's policies

The EV Disruptive “S” curve

PHEV (Plug-In Hybrid Electric Vehicle) – transition to full electric

Many more PHEVs are entering the market* in the next 18-36 months



Manufacturer	Compact	Mid-Size	SUV
Audi		X	X
Honda		X	X
Hyundai		X	
Kia		X	X
Mercedes		X	X
Nissan		X	
Toyota		X	
Volvo		X	X
Volkswagen		X	X

* Manufacturers are not currently required to make them available in BC

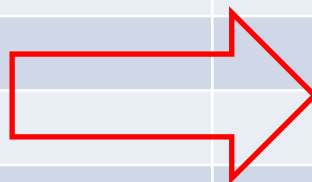
The EV Disruptive “S” curve

BEV (Battery Electric Vehicle)

Many additional 320 km+ BEVs are coming* in the next 12 to 36 months



Manufacturer	Compact	Mid-Size	SUV
Audi	X	X	X
BMW	X	X	X
Ford		X	X
Honda		X	
Hyundai		X	
Kia		X	
Mercedes		X	X
Nissan	X	X	
Tesla		X	
Toyota		X	
Volvo		X	X
Volkswagen		X	X



* Manufacturers are currently not required to make them available in BC

The “game changer” – the 320 km (200 mile) EV



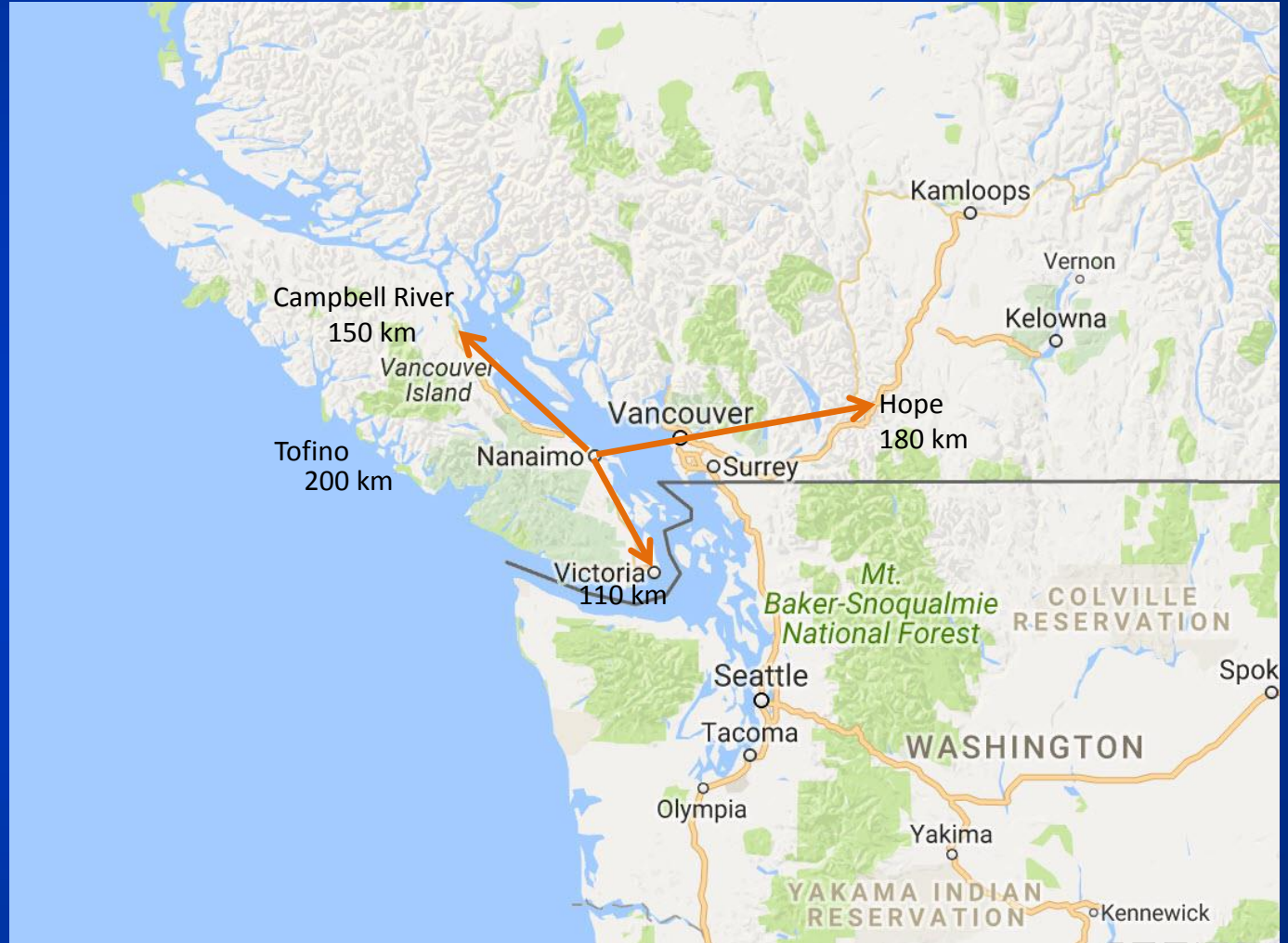
Bolt - 380 km



Tesla 3 - 340 + km



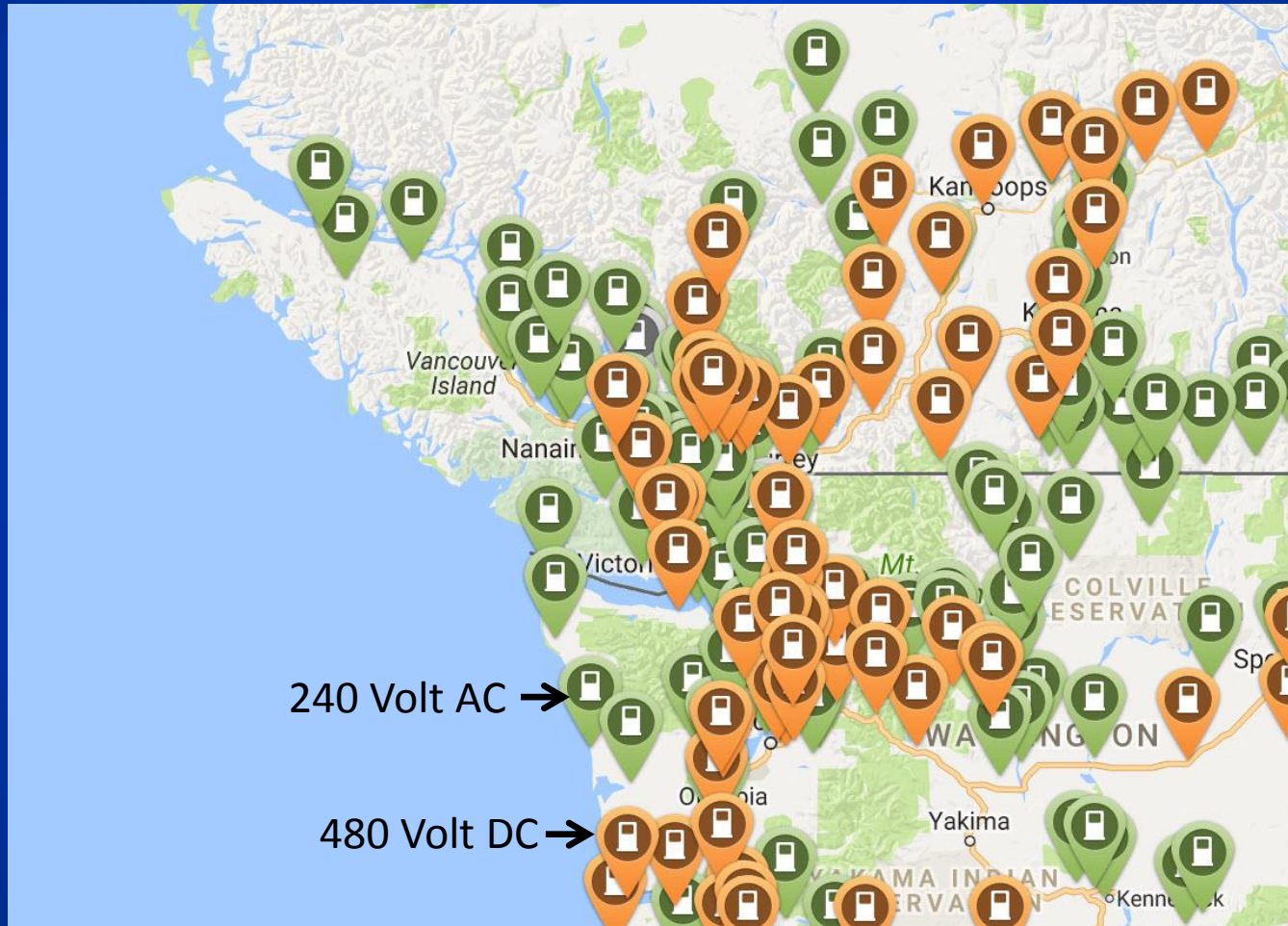
Leaf 2.0 - 340 + km



320 km EV planning range: 300 km in summer 200 km in winter

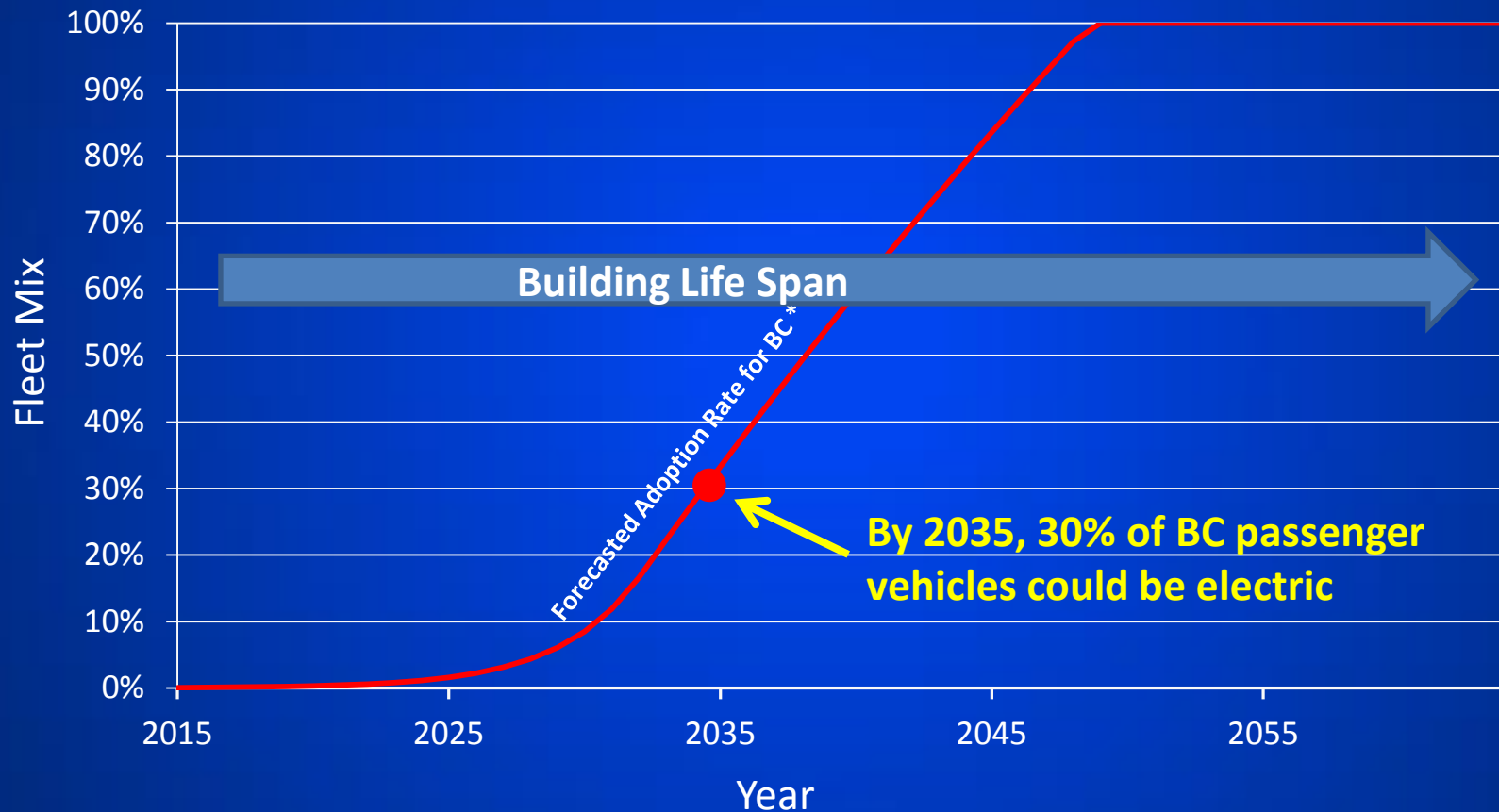
The “game changer” – the 320 km (200 mile) EV

Current Electric Vehicle charger locations



The S curve impact on Strata Value

BC Light Duty Fleet Mix Projection



Impacts on Strata Value

Prospective Buyers Want:

- ✓ Parking
- ✓ In-unit washer and dryer
- ✓ Dishwasher
- ✓ Fireplace
- ✓ 2nd Bathroom
- ↑ ✓ Electric Vehicle Charging



Impacts on Strata Value

EV adoption rates are (already) slower because of lack of access to chargers in apartments and strata units.

(30% - 50% of households in BC are Strata units)

“Future-proofing” buildings

- Property values will be affected as prospective buyers increasingly regard EV charging as a “must have”
- Being proactive and keeping up with EV demand will help to maintain property values and access to all prospective buyers
- **Retention of existing owners/tenants**
- The environmental moral / ethical issue

Straw Poll – Show of hands

How many of you have:

➤ a Plug in Electric Vehicle ?

➤ Driven or had a ride in a Plug in Electric Vehicle ?




How many of you :

➤ Have heard about someone asking about EV charging in your building ?

➤ Think that it is a matter of time before someone asks about EV charging?

Types of EV charging for Residential Buildings



EV Type	Variable	Level 1 110 Volts	Level 2 220 Volts
Plug – in Hybrid	Charge Time	5 hrs	2.5 hrs
	Typical night Charge	5 hrs	2.5 hrs
	kW rate	1.7 kW	3.3 kW
100% Electric Gen 1 160 km Leaf /Kia/Smart	Charge Time	12-15 hrs	4 – 7 hrs
	Typical night charge	4-8 hrs	1-2 hrs
	kW rate	1.7 kW	3.3 - 10 kW
100% Electric Gen 2 320+ km Tesla/Bolt	Charge Time	24-30 hours	8 hrs
	Typical night charge	4 -8 hrs	1-2 hrs
	kW rate	1.7 kW	6.6 -15 kW

- [1] Typical night charge estimated for Vancouver Island (with lower commute distances and times)
- [2] Charging rates in kW vary between 3.3 and 10 kW depending on make and model (Tesla exception)
- [3] Level 3 450 Volt DC charging not applicable to residential units. Typical 80% charge in 30 minutes
- [4] Teslas have access to the Supercharger Network providing up to 550 km of charge per hour

Types of EV charging for Residential Buildings



- Ways to reduce charging equipment costs
 - Separate hydro meter for EV charging (BC Hydro)
 - Shared charging – share power with multiple EVs
 - Shared charging spaces

Types of EV charging for Residential Buildings



- Every Building is different
 - Type of parking and ownership/control of spaces
 - Location of parking
 - Location of electrical room
 - Physical conditions around the parking spaces
 - Ability to share charging infrastructure

Additional Information

EV Chargers in Condominiums – Video



<https://youtu.be/28KXX3Favk8>

Additional Information

Multiple Residential Unit Charging Infrastructure

VISOA visoa.bc.ca - seminar notes

CMHC insideevs.com - EV news and information

MURB Subsidies pluginbc.ca - Ministry of Energy and Mines

Electric Vehicles

Victoria EV Club victoriaevclub.com - membership is free

Vancouver EV Association veva.ca – Electric Vehicle information

Inside EVs insideevs.com – EV news and information

Charging locations plugshare.com - EV charging locations for Canada and U.S.A.

CEV (Clean Energy Vehicles for BC) cevforbc.ca - \$5,000 off an EV PLUS

BC Scrap It Program scrapit.ca - \$3,000 - \$6,000 off an electric vehicle (EV)