



# **EV Developments in Scotland**

## **- The Challenges And Opportunities**

**By Douglas Robertson BSc., President,**



Electric Vehicle Association Scotland

**For the Scottish Transport Studies Group at Royal Scots Club Edinburgh 26 Nov. 2019**

# About EVA Scotland



**The Electric Vehicle Association (EVA-Scotland) is now a self-funded non-profit non-political Community Interest Company (CIC). It started life in 2009 as a group of 4 individuals who had switched to electric vehicles. Now we have over 1200 Members.**

**We are affiliated with AVERE (the European Association for Electromobility).**

# EVA Scotland's aims are:



- **To represent the interests of EV users in Scotland and offer them the benefits of membership of EVA Scotland**
- **To promote the benefits of EVs to non-EV users and influence widespread adoption**
- **To be the public voice of EVs on all issues of ownership, driving and infrastructure with stakeholders, the media, in politics, and with all levels of government, during the phasing out of new petrol and diesel cars and vans in Scotland by 2032 and beyond**

# Douglas Robertson - Background



**Retired Mechanical Engineer**

**40 Year Career in Plastics, Oil & Gas, TV Production, Water & Sewerage, and Construction industries in UK, EU, and Middle East**

**10 years experience as Project Engineer on “ULTra” Automatic battery-powered vehicles installed at T5 Heathrow between 2007-2010**

**Electric Vehicle Association Scotland (EVAS) member since 2013**

**EVAS Deputy Chair 2014/15  
EVAS Chair in 2015/16**

**Director of EVA Scotland 2017  
Hon. President 2018**

# Scotland's EV Ambition



## Scotland wants to win the race to electrification



***“We will take the lead in promoting the use of ultra-low emission vehicles (ULEVs) and phase out the need for new petrol and diesel cars and vans by 2032, well ahead of the 2040 target recently announced by the UK Government.”***

**How many here today think the 2032 target is achievable?**

**I hope I can help raise more hands by the end of my talk**

# SMMT UK EV Sales Figures 2019



## October

	2019	2018	% change	Mkt share -19	Mkt share -18
<b>Diesel</b>	34,666	48,381	-28.3%	24.2%	31.5%
<b>Petrol</b>	89,371	92,348	-3.2%	62.4%	60.1%
<b>BEV</b>	3,162	1,256	151.8%	2.2%	0.8%
<b>PHEV</b>	3,119	3,173	-1.7%	2.2%	2.1%
<b>HEV</b>	7,950	6,168	28.9%	5.5%	4.0%
<b>MHEV diesel</b>	3,251	680	378.1%	2.3%	0.4%
<b>MHEV petrol</b>	1,732	1,593	8.7%	1.2%	1.0%
<b>TOTAL</b>	<b>143,251</b>	<b>153,599</b>	<b>-6.7%</b>		

## Year to date

	YTD 2019	YTD 2018	% change	Mkt share -19	Mkt share -18
<b>Diesel</b>	515,054	653,736	-21.2%	25.7%	31.7%
<b>Petrol</b>	1,306,948	1,278,625	2.2%	65.2%	61.9%
<b>BEV</b>	28,259	12,555	125.1%	1.4%	0.6%
<b>PHEV</b>	25,892	35,317	-26.7%	1.3%	1.7%
<b>HEV</b>	85,871	73,734	16.5%	4.3%	3.6%
<b>MHEV diesel</b>	22,741	2,537	796.4%	1.1%	0.1%
<b>MHEV petrol</b>	20,757	7,915	162.2%	1.0%	0.4%
<b>TOTAL</b>	<b>2,005,522</b>	<b>2,064,419</b>	<b>-2.9%</b>		

**BEV** - Battery Electric Vehicle; **PHEV** - Plug-in Hybrid Electric Vehicle; **HEV** - Hybrid Electric Vehicle, **MHEV** - Mild Hybrid Electric Vehicle

Norway sells over 50% EVs each month

Norway is now 5 to 6 years ahead of Scotland

China sold over 1.2M EVs in 2018

China's E-Bus Fleet was more than 450,000 in 2018 and Sales peaked at 115,000 in 2015

## Current 2019 Models

**Around 12 BEVs are available in the UK**

**- 8 main models being Leaf40, Zoe41, Hyundai Ioniq28, Hyundai Kona64, Kia Niro64, Jaguar i-Pace, Tesla 3, BMW i3**

## New Models promised from 2020 onwards

**Around 25 New BEVs are promised in the UK**

**- 14 main models being Leaf62, Zoe50, Hyundai Ioniq38, VW ID3, VW ID Crozz, Skoda CitigoE, SEAT MiiE, Tesla Y, Volvo XC40E, Merc EQC, BMW iX3, Audi E-Tron, Honda UrbanE, Ford Mustang E**

# The Challenges & Opportunities for Transport Electrification

## The Challenges

**Climate Change – Reduction of Greenhouse Gas Emissions**

**Air Quality Improvements**

**Increasing BEV Uptake through better Public Awareness of BEV Benefits**

**Securing Global Economies after the Depletion of Oil and Gas**

## The Opportunities

**Stopping Climate Chaos – Sea Rises, Extreme Weather etc.**

**Improving Public Health**

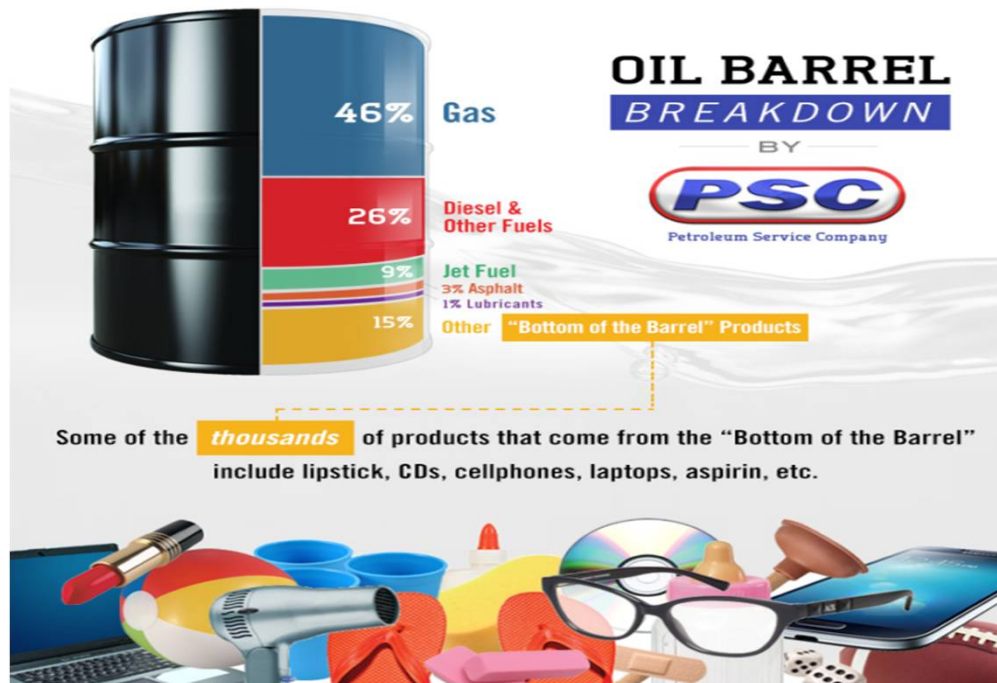
**Electricity Grid Balancing – Using Battery-Storage**

**Ensuring the Survival of the Human Race as we know it today**



# What is typically made from a barrel of Oil?

## THE BOTTOM OF THE BARREL *ISN'T SO CRUDE* What's in a Barrel of Oil?



**Petrol & Diesel 72%**

**Jet Fuel 9%**

**Tarmac 3%**

**Lubricants 1%**

**Plastics etc. 15%**

# The Main Greenhouse Gas Emitters?



**Table B1. Scottish Greenhouse Gas Emissions by Gas and by Scottish Government Source Sector, 2017. Values in MtCO<sub>2e</sub>**

	TOTAL	Percentage share by sector	Carbon dioxide	Methane	Nitrous oxide	Fluorinated gases
<b>TOTAL</b>	<b>40.5</b>	<b>100.0%</b>	<b>29.6</b>	<b>6.4</b>	<b>3.2</b>	<b>1.3</b>
Transport (including International Aviation and Shipping)	14.9	36.8%	14.7	0.0	0.2	0.0
<i>Transport (excluding IA&amp;S)</i>	13.0	32.1%	12.9	0.0	0.1	0.0
<i>International Aviation and Shipping (IA&amp;S)</i>	1.9	4.6%	1.9	0.0	0.0	0.0
Agriculture and Related Land Use	9.7	23.9%	2.8	4.3	2.6	0.0
Business and Industrial Process	8.7	21.4%	7.4	0.0	0.1	1.2
Residential	6.0	14.9%	5.8	0.1	0.0	0.1
Energy Supply	6.0	14.9%	5.6	0.4	0.1	0.0
Development	2.0	4.9%	1.8	0.0	0.1	0.0
Waste Management	1.7	4.2%	0.0	1.6	0.1	0.0
Public Sector Buildings	1.1	2.7%	1.1	0.0	0.0	0.0
Forestry	-9.5	-23.6%	-9.6	0.0	0.1	0.0

**Road & Rail Transport 32.1%**

**Air & Shipping 4.6%**

**Residential 14.9%**

**Residential + Road & Rail 47% In our hands**

**US consumes 50 x more Poultry and 2.38 x more beef than UK**

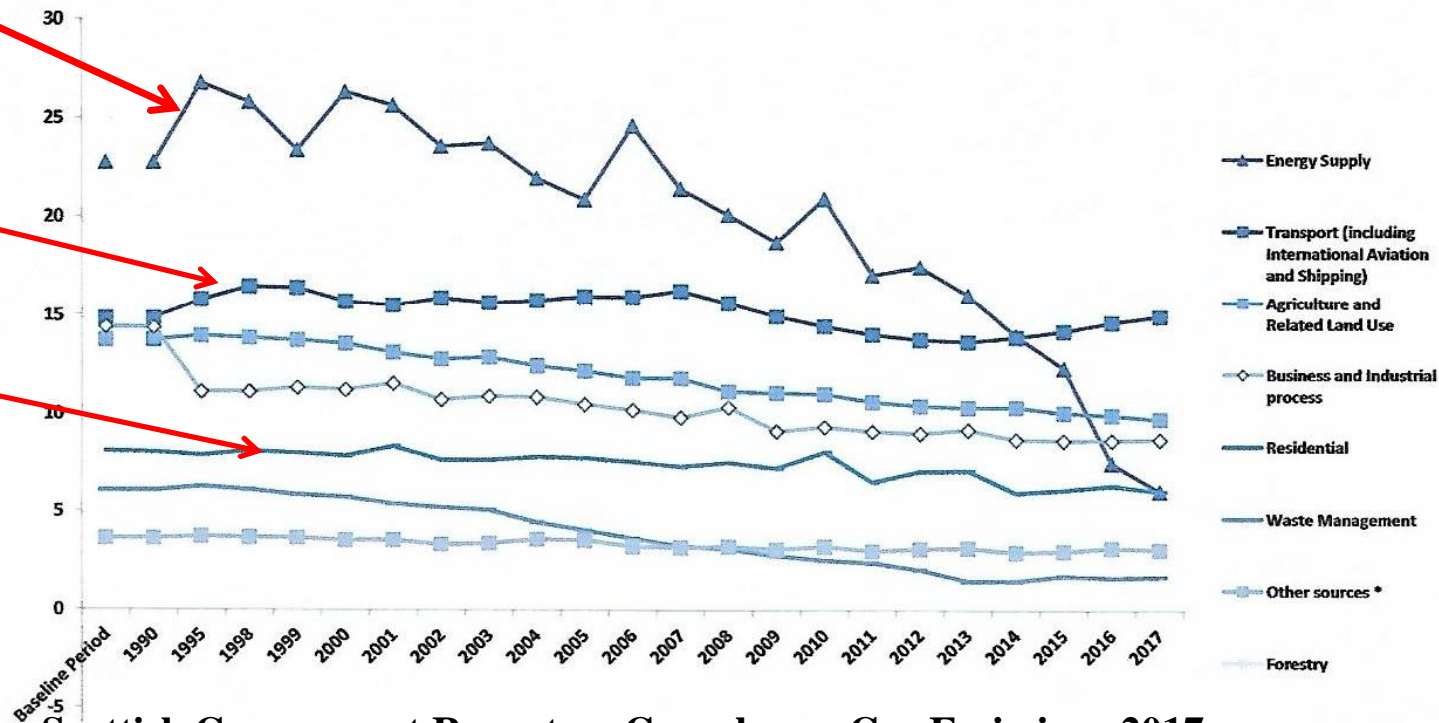
**Air & Shipping less than 15% of Road & Rail**

**Agriculture = Forestry Sink**

Scottish Government Report on Greenhouse Gas Emissions 2017

# The Main Greenhouse Gas Emitters?

Chart B2. Main Sources of Greenhouse Gas Emissions in Scotland, 1990 to 2017. Values in MtCO<sub>2</sub>e



Energy Supply Down 74%

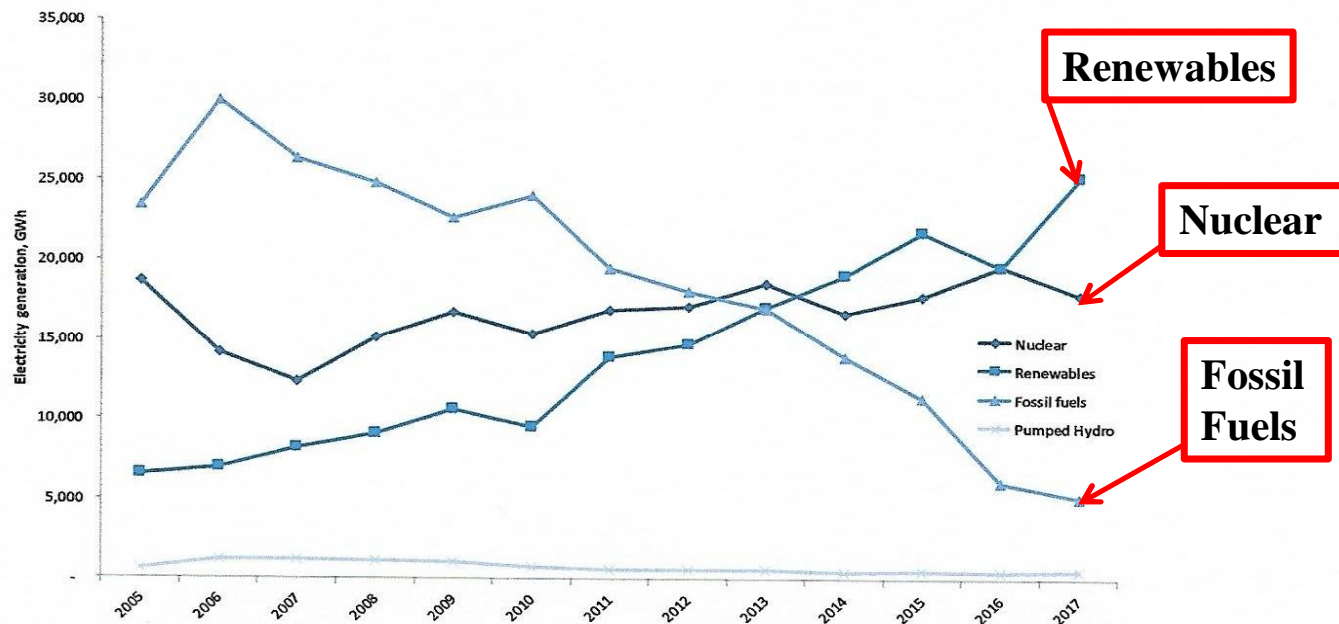
Transport Steady

Residential Fairly Steady

Scottish Government Report on Greenhouse Gas Emissions 2017

# The Split in Electricity Generation

**Chart B3. Generation of Electricity by Fuel, Scotland, 2000 to 2017. GWh of Electricity Generated by Year**



Data obtained from Scottish Energy Statistics Database<sup>5</sup>

**Renewables – 25,000GWh (56%), Nuclear – 15,000GWh (33%), Fossil Fuels – 5,000GWh (11%)**

**Scotland exported 28.9% of its Electricity Produced in 2017 – mainly to England ~ £1.3B at 10p/kWh**

# Personal BEV & Solar PV Milestones



**Feb. 2015**

**2013 - 2019**



**Nissan Leaf 24kWh**

**Acenta 26,500 miles**

**2013-15**

**Nissan Leaf 24kWh**

**Tekna 33,250 miles**

**2015- to date**



**4kW Solar PV Generated  
Over 18,400kWh of green  
energy to date**

**2017-2020**



**BEVs Total Lifetime Cost 71% of ICE**

**Hyundai Ioniq 28kWh**

**30,700 miles since Oct. 2017**

**Fabia 1.4TDI cost 49p./mile over 48k miles and 4.5 years**

**Over 90,000 carefree BEV miles since June 2013 @ 35p./mile**

# “Real-World” Savings from Solar PV & Zappi Smart Charging

## Estimated Typical 24-hour period usage & savings from Solar PV and Zappi Charger

Solar PV usage still less than 80%

Could Battery-Storage use the remaining 20%?



- **Home + EV before Solar PV & Zappi Installation:**

Day Elect. Used – **8.5kWh**

Night Elect. Used – **12.75kWh**

- **After Solar & before Zappi:**

Day Elect. Used – **5.58kWh** or  
34% saving on non-Solar usage

Night Elect. Used – **6.55kWh**  
or 49% saving on non-Solar usage

O/A. Electricity saving of **43%**

- **After Zappi Installation:**

Day Elect. Used – **4.7kWh** or  
45% saving on non-Solar usage

Night Elect. Used – **4.3kWh**  
or 66% saving on non-Solar usage

O/A. Electricity saving of **58%**

**Estimated Savings of £585/year at current rates**

**How many here today now think the Scottish Government 2032 target is achievable?**

**Thank you for Listening  
Any questions?**

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