

BGA CONFERENCE 2023

G.A. IS MOVING TOWARDS REDUCING AIR & NOISE POLLUTION

SUSTAINABILITY IN GENERAL AVIATION

DEVELOPMENTS IN ELECTRIC AVIATION AND ACHIEVEMENTS

CURRENT EXPERIENCE OF FLYING ELECTRIC

REDUCING AIR & NOISE POLLUTION IN GENERAL AVIATION

Petrol - highly flammable, toxic liquid, spreads and evaporates continuously, changing its chemistry



Imagine you had never heard about Internal combustion engines... and were told that you would carry a highly flammable, explosive and poisonous liquid which is very dangerous, expensive and complex to drill out of the ground, transport, refine, then more transport to supply.. All of this is single use, “burn, explode, exhaust, emit CO2 and other toxins” with no chance to recycle nor to re-use

Internal Combustion Engine, produces heat, noise, smoke and ≈ 3.3 kg of CO₂ for every kilogram of fuel burnt by engine and is non-recyclable fuel



How does 1 kg of Petrol produce $\approx 3.3\text{kg}$ of CO_2

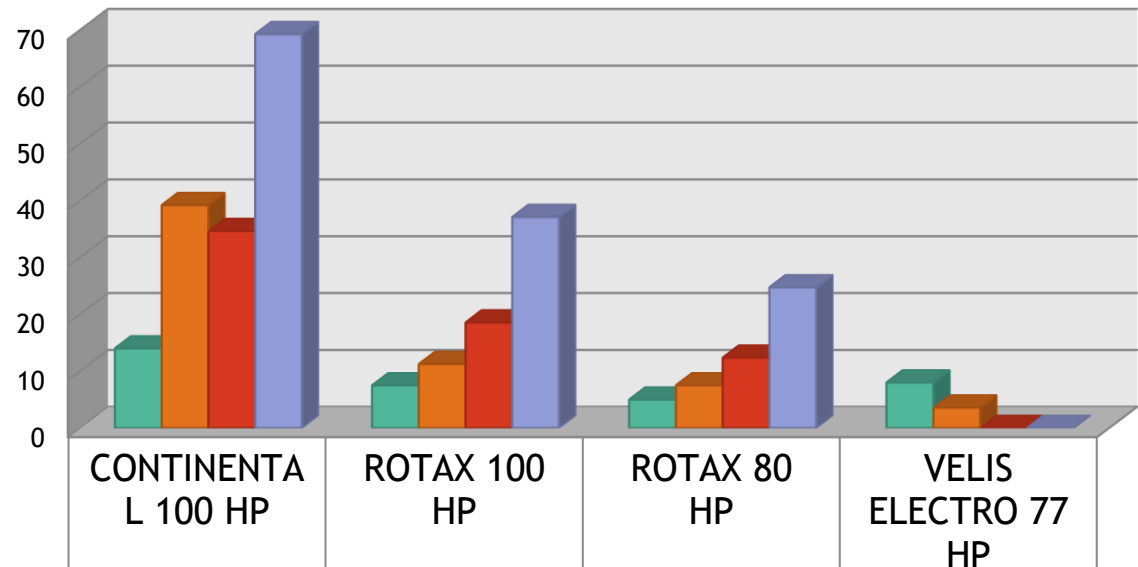
- * The Stoichiometric Ratio required to burn petrol (and other Hydro-Carbon fuels)
- * 1 kg of petrol requires 14 kg of air to burn
- * 1 kg of petrol contains ≈ 870 gm of C (*the remainder 130 gm is Hydrogen, other trace chemicals and additives, aromatics, etc*)
- * 14 kg of air contains ≈ 2.95 Kg of O_2 (*the remainder is Nitrogen and other gases*)
- * During combustion they produce heat energy for power, by-products are lots of CO_2 and a tiny amount of H_2O (water)

Fuel consumed / Fuel Cost / CO₂ emitted / Planting Trees to offset CO₂

| TYPE OF AIRCRAFT/ENGINE | FUEL / ELECTRICITY | LPH OR KWH | HOURS PER ANNUM | FUEL/ELE CTRICITY USED | TOTAL COST OF FUEL/ELECTRICITY | INFLIGHT CO2 EMISSION IN KG | TREE PLANTING AREA SQUARE METERS TO OFFSET CO2 |
|----------------------------|-----------------------|------------------|-----------------------|------------------------------|--------------------------------------|--------------------------------------|---|
| CONTINENTAL 100 HP | £2.80 | 28 | 500 | 14000 | £39,200.00 | 34,650 | 69300 |
| ROTAX 100 HP | £1.50 | 15 | 500 | 7500 | £11,250.00 | 18,563 | 37125 |
| ROTAX 80 HP | £1.50 | 10 | 500 | 5000 | £7,500.00 | 12,375 | 24750 |
| VELIS ELECTRO 77 HP | £0.45 | 16 | 500 | 8000 | £3,600.00 | 0 | 0 |

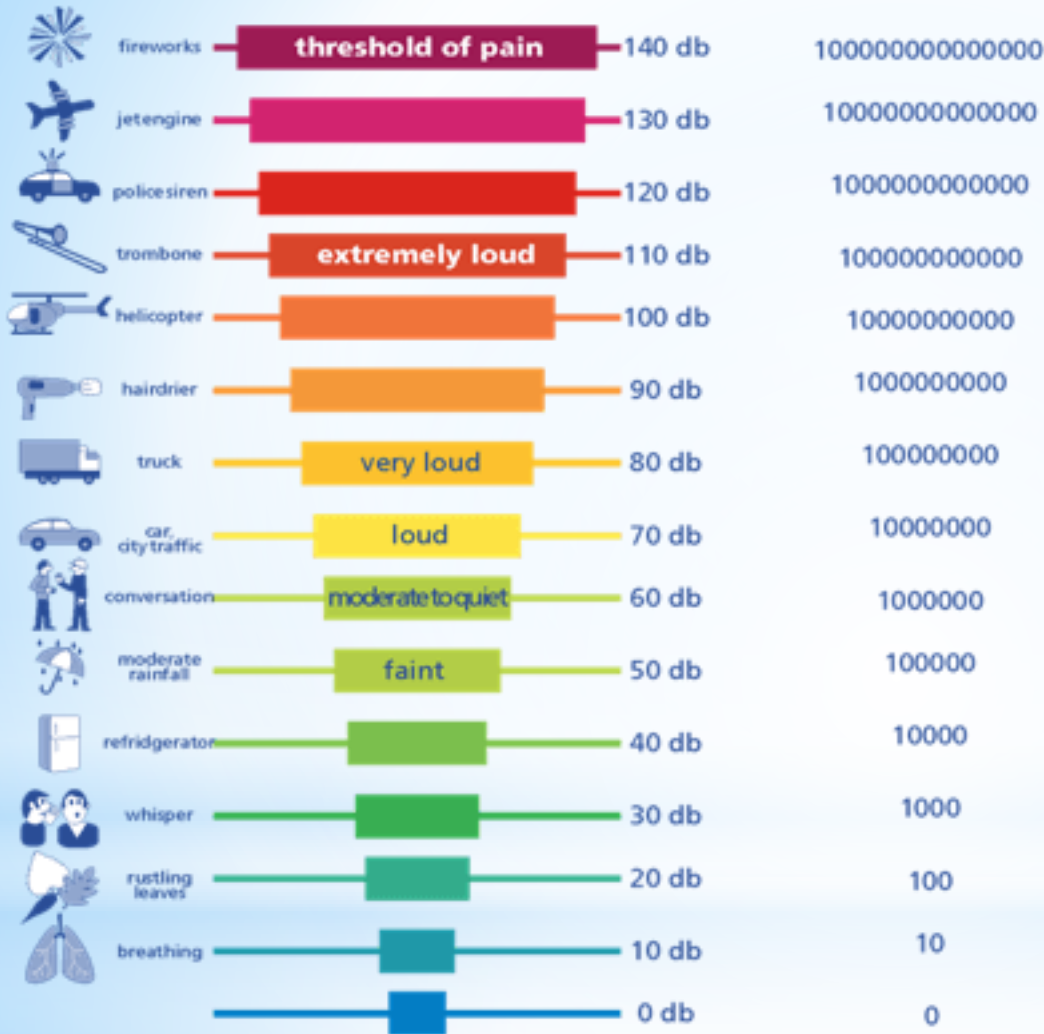
fuel and electricity prices as on 18 February 2023

Fuel consumed / Costs / CO₂ emitted / Planting Trees to offset CO₂



| | | | | |
|--|------------|------------|-----------|-----------|
| FUEL/ELECTRICITY USED | 14000 | 7500 | 5000 | 8000 |
| TOTAL COST OF FUEL/ELECTRICITY | £39,200.00 | £11,250.00 | £7,500.00 | £3,600.00 |
| INFLIGHT CO2 EMISSION IN KG | 34,650 | 18,563 | 12,375 | 0 |
| TREE PLANTING AREA SQUARE METERS TO OFFSET CO2 | 69300 | 37125 | 24750 | 0 |

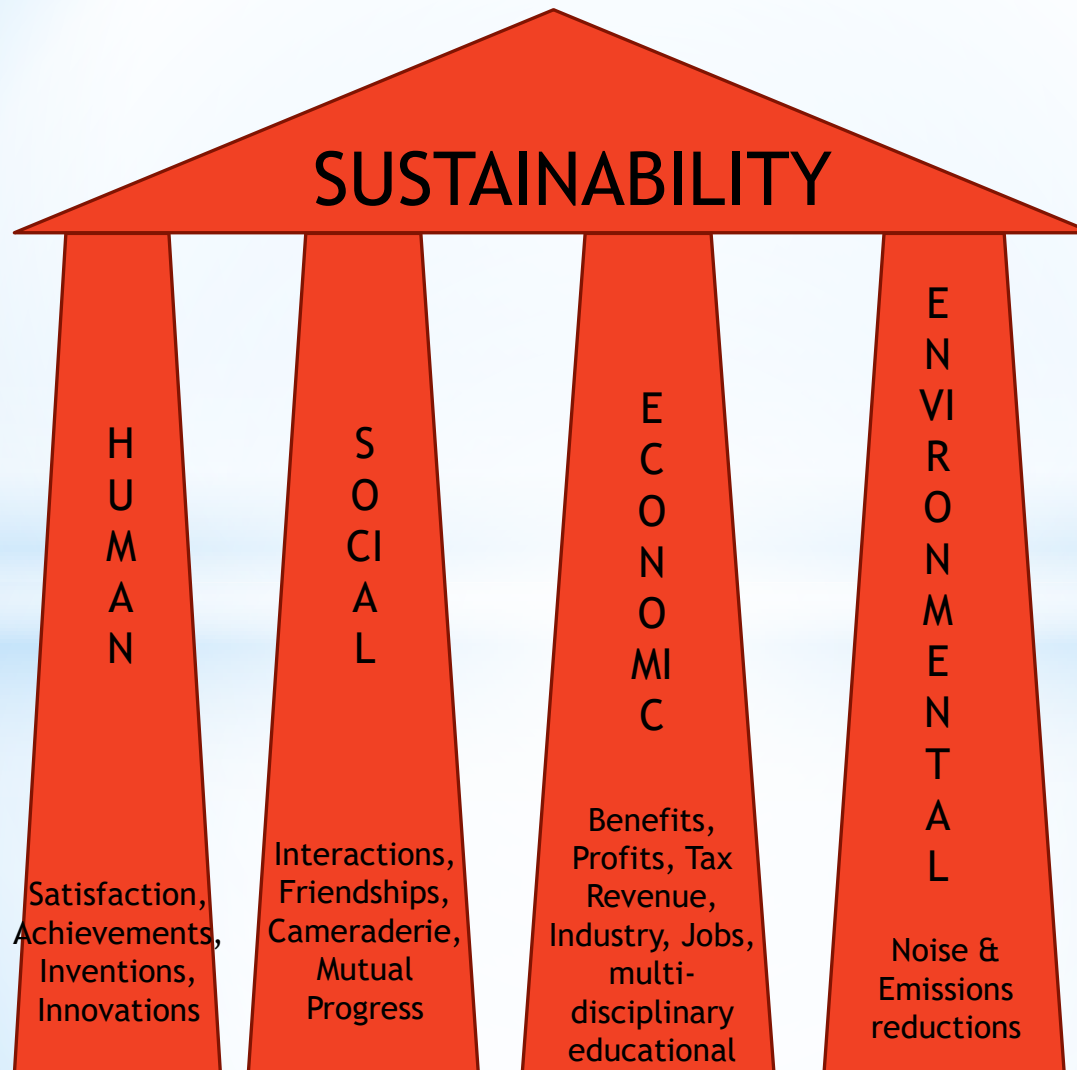
Noise Limits and Noise Created



| TYPE OF AIRCRAFT | NOISE LIMIT in dB |
|------------------------|-------------------|
| JET PLANES | 160 |
| HELICOPTER (R-66) | 90.9 |
| LIGHT AIRCRAFT (c-152) | 79 |
| GYROCOPTERS | 69 |
| ELECTRIC AIRCRAFT | 60 |
| MICROLIGHT / LSA | 60 |
| GLIDERS | 0 |

WHAT IS SUSTAINABILITY IN HOBBY FLYING

Sustainability consists of fulfilling the needs of current generations without compromising the needs of future generations, while ensuring a balance between economic growth, environmental care and social well-being.....



HUMAN

- Deep subconscious desire to fly in every human
- Flight from danger into safety
- Desire to see the world surrounding us due to innate curiosity in every human being
- Addictive experience of deep pleasure and achievement when flight is made
- Personal Transport for work and leisure

S O C I A L

- Accessible to a large proportion of humans - even those who may be less physically able - inclusive activity
- Satisfies a deep Human desire for friendships/camaraderie/sharing common passions/interests
- Creating a Community for Aviation Enthusiasts
- Relatively low entry threshold of medical & monetary capacity compared to PPL / CPL / Military aviation
- Flights from grass strips and non licensed airports granting more accessibility & affordability
- “Further Education” for Young People & Adults

E C O N O M I C

Modern / efficient designs - Frugal fuel burn

Low maintenance costs -

Short field capability (“ A 500 meter runway can enable you to fly around the world”)

Means of income activity and livelihood for thousands of people involved

Generates tax income for U.K. Gov through VAT ; direct duties on fuel purchase; income tax paid by clubs, flight instructors, associated traders

Retail sales generated of aircraft and parts instruments etc. helps the economy of the state

Related industry output of high quality goods and services e.g Pooleys- SkyDemon- Rotax - Ozee - Repairers

ENVIRONMENTAL

Reduced noise, thus reduced visibility leading to reduced nuisance impact on neighbours.

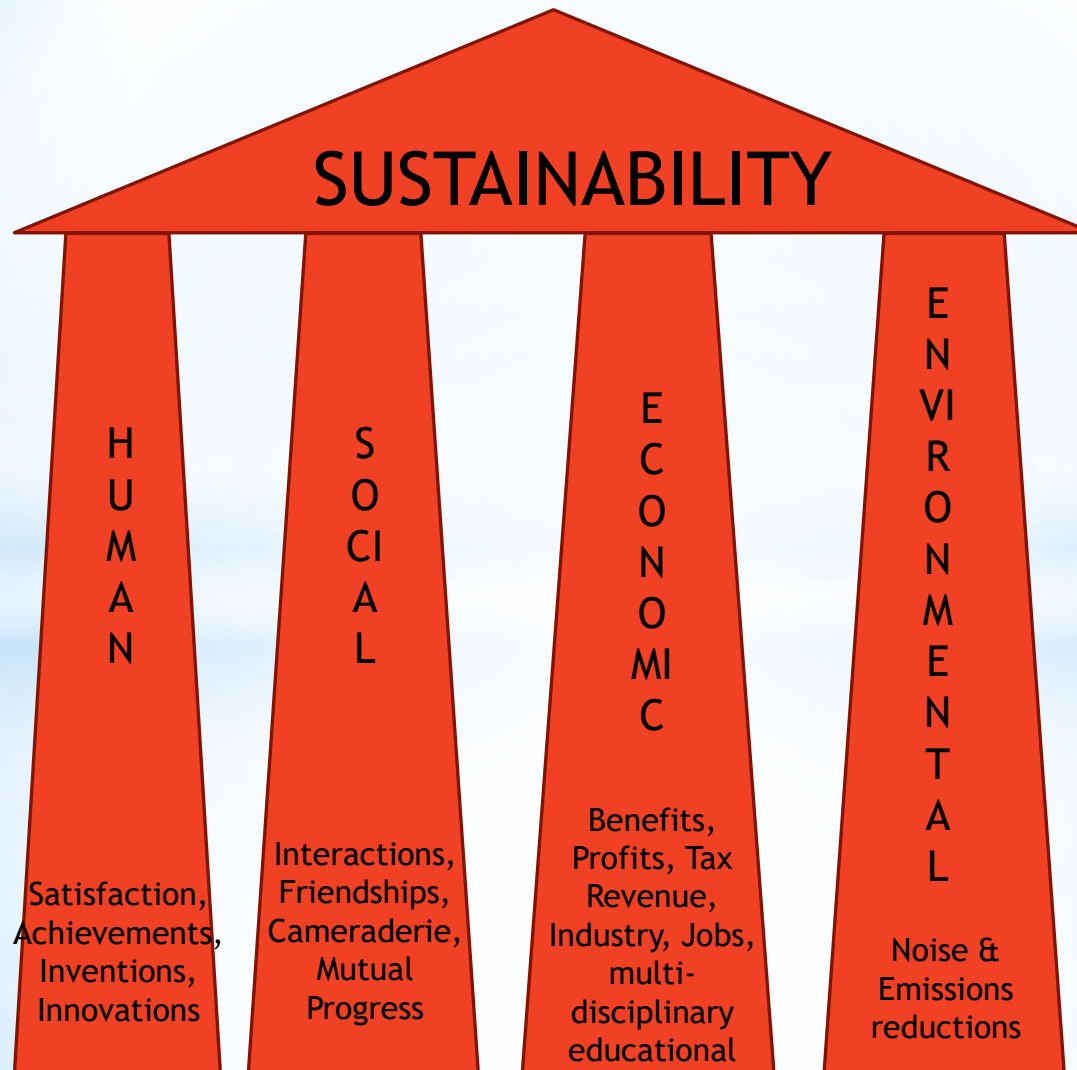
Very low emission due to modern engineering

Unleaded petrol reduces Carbon & Lead emissions

Ethanol content makes better combustion, thus further reducing emissions

Frugal use of oil - disposal of used oil is well established

Minimal infrastructure required for Microlight / Motorglider flying, thus wider environment footprint is light weight.



DEVELOPMENTS IN ELECTRIC AVIATION



| YEAR | TYPE |
|------|--|
| 2024 | TAURUS ELECTRO - UK CERTIFICATION ? |
| 2020 | VELIS - WORLDS FIRST CERTIFIED ELECTRIC A/C |
| 2017 | ALPHA ELECTRO MICROLIGHT |
| 2014 | WATTS UP PROTOTYPE |
| 2011 | TAURUS G 4 SEAT WINS NASA PRIZE |
| 2007 | TAURUS ELECTRO |
| 1950 | FIRST COMMERCIAL CERTIFIED JET AIRLINER, COMET |
| 1904 | POWERED AIRCRAFT WRIGHT BROS |
| 1890 | I.C.ENGINES |

TAURUS ELECTRO



Adventure Electrified

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**TAURUS G4 WINS NASA
PRIZE IN 2011 \$1.3 MILLION**





DESIGNED & BUILT IN MODERN FACTORY, WITH EASA / UK CAA DOA & POA

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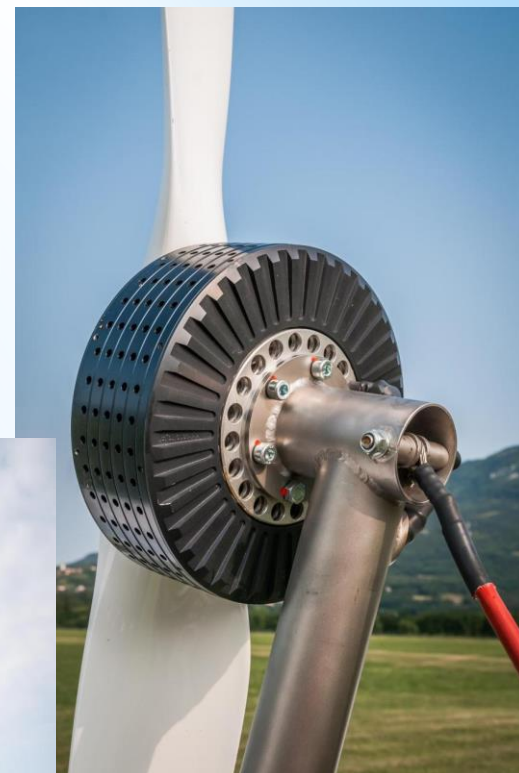
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FLY ABOUT AVIATION

28/02/2023

FREE FLIGHT FROM TRAILER TO RUNWAY TO SKY SELF CHARGING HANGAR-TRAILER



CURRENT EXPERIENCE OF FLYING ELECTRIC



SUNLIGHT TO FLIGHT - ZERO EMISSION- ZERO POLLUTION IN FLIGHT

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3 phase AC >> Charger >> Aircraft



Electric Charger to Velis – very efficient in converting chemical energy into motion



Rotax 100 hp ICE <-> Electric motor 77 hp



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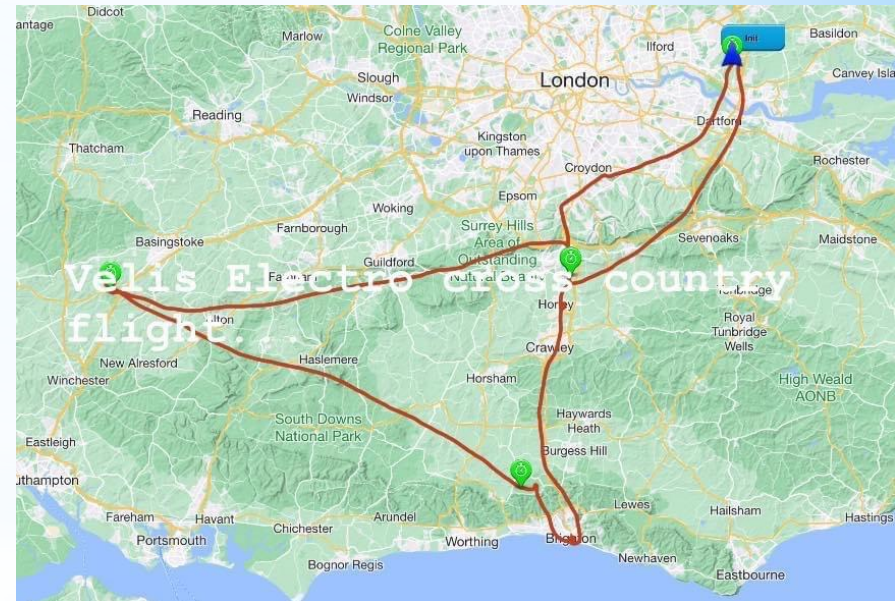
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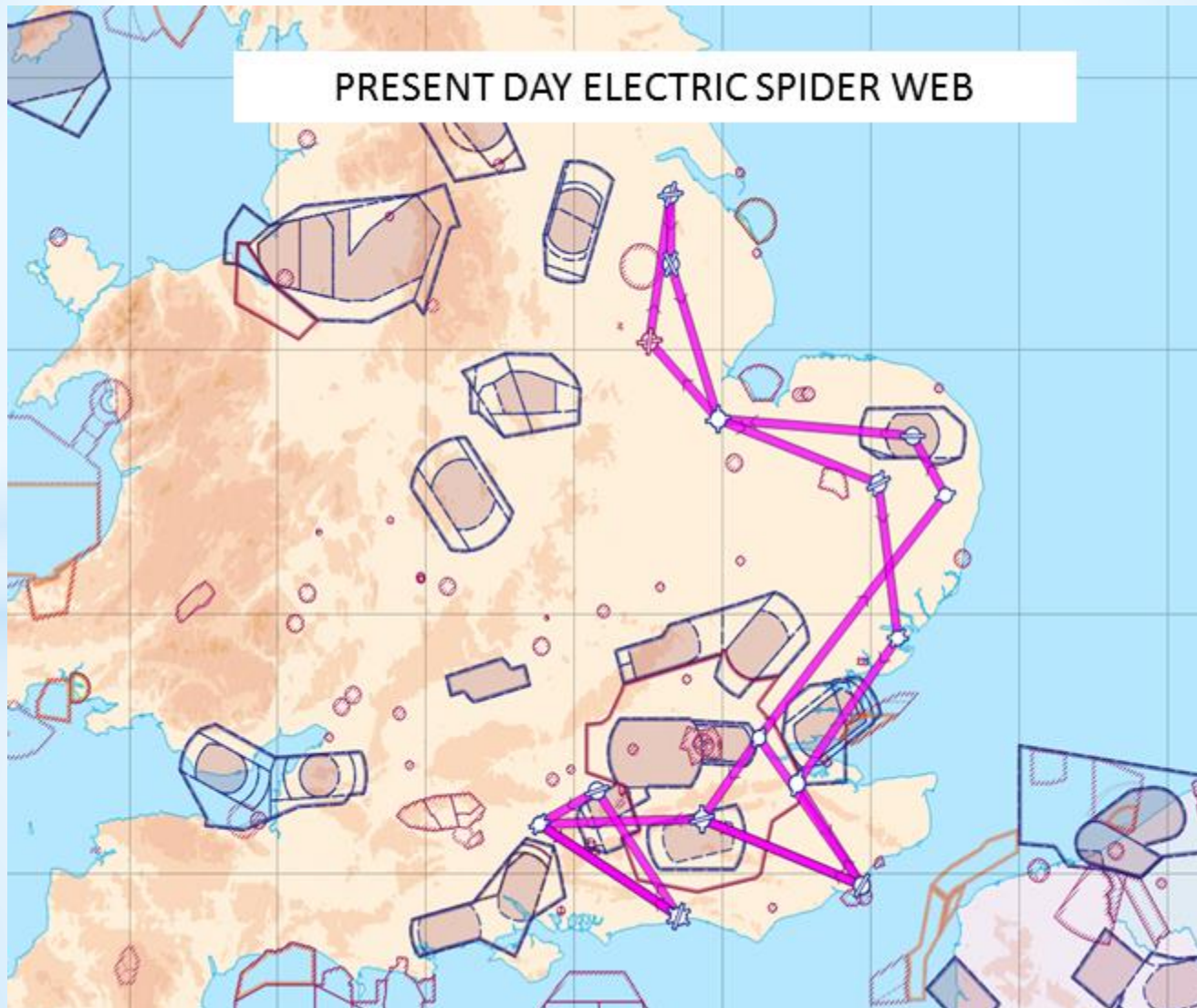


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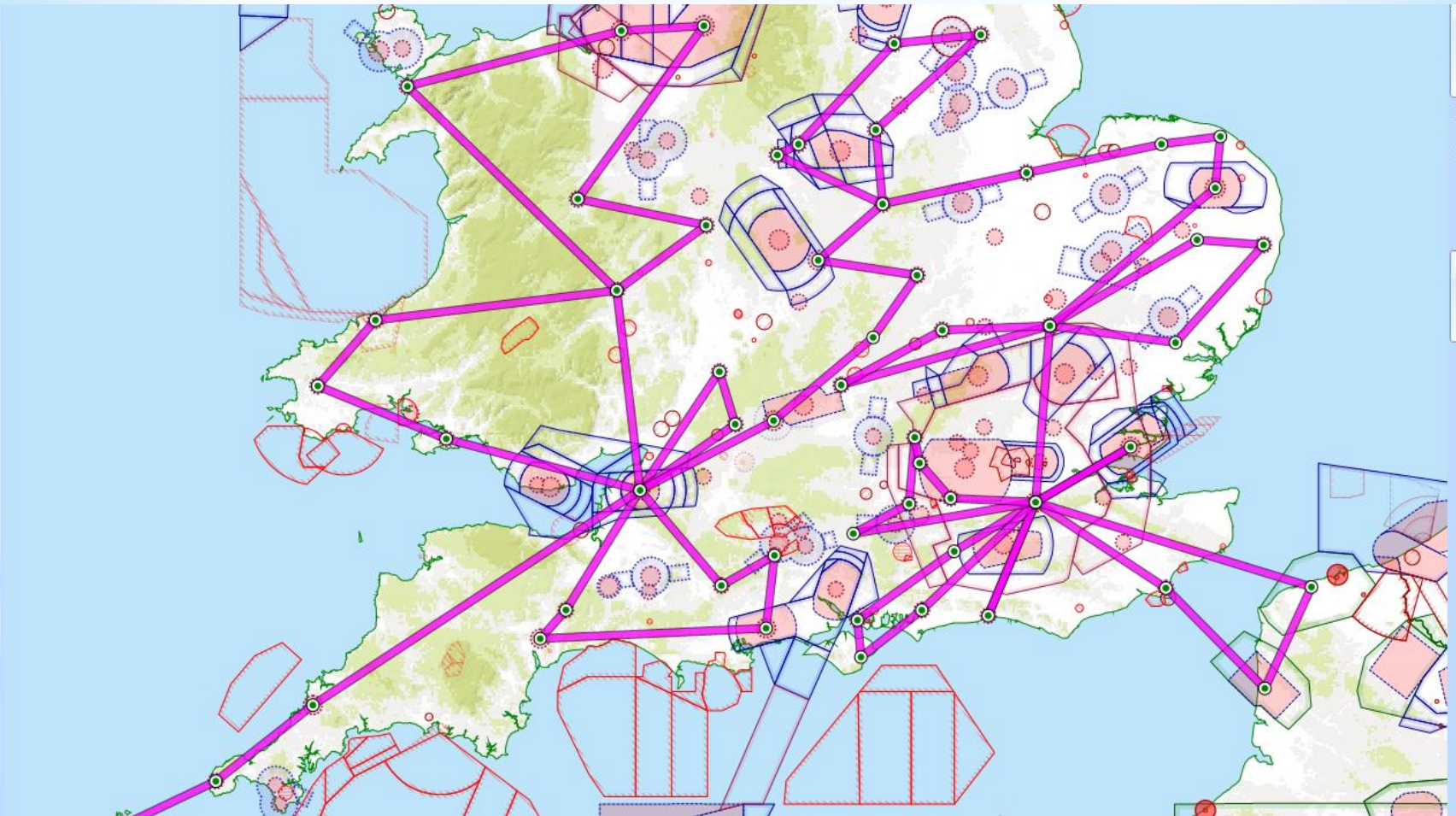
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You can help spread the Electric Spider Web....



Thank you for your attention

Questions / Discussion