



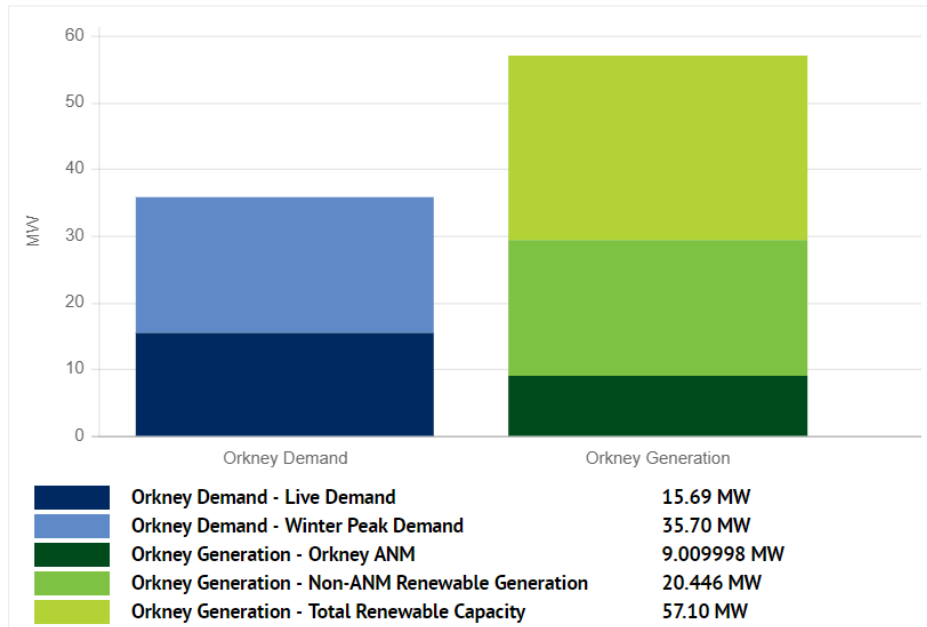
Driving innovation in hydrogen via international collaboration: the EMEC experience

Dr James Walker
Hydrogen Development Manager

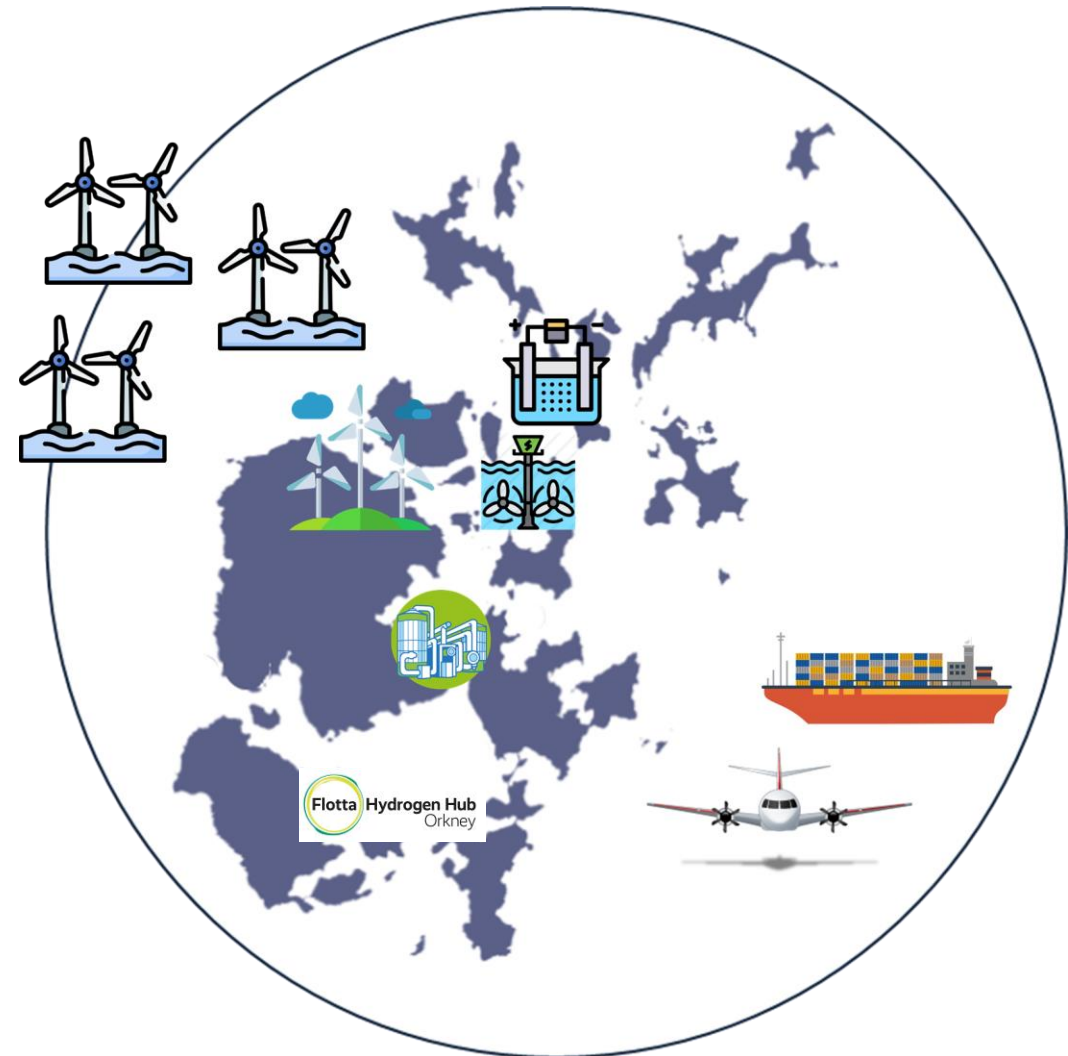


Setting the scene

We are demonstrating the role for hydrogen in island energy transitions



- Hydrogen first gained traction as a proposed means of storing renewable **power** which would otherwise be **curtailed**
- Once produced, hydrogen can be used to **decarbonise energy intensive applications**



Our hydrogen research programme covers the full value chain



1. Producing hydrogen via electrolysis

We power our electrolyzers using **tidal and wind** generation co-located at our test site.



2. Storing and handling hydrogen

We have demonstrated inter-island transport of hydrogen and developed **state-of-the-art mobile refuelling** equipment.



3. Developing hydrogen use cases to support decarbonisation activities

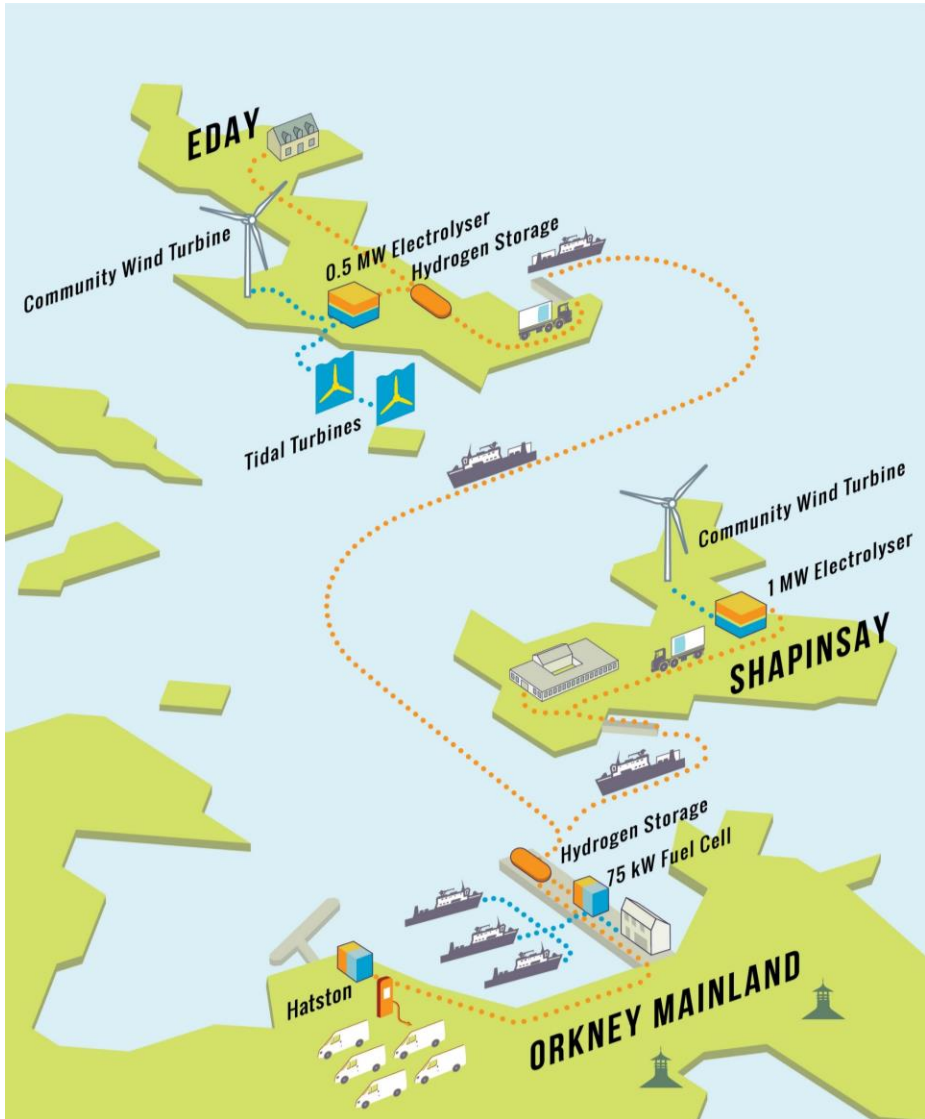
Our projects have tested new ways of using hydrogen, including in **transport**, e.g. **vans, ferries and aeroplanes**, as well as in industrial **heat**, investigating feasibility for use in **distilling**.





Driving innovation through international collaboration

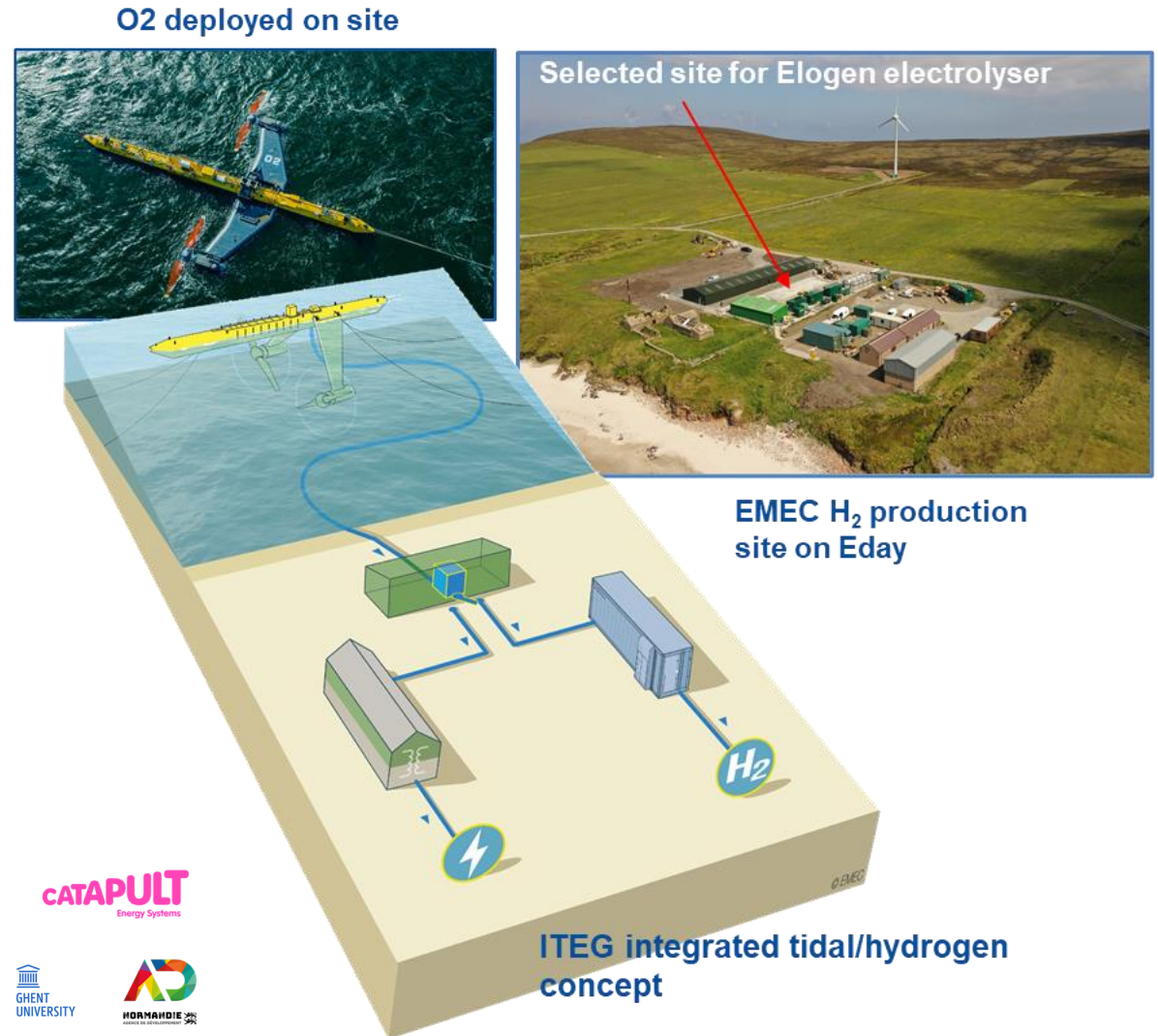
European collaboration is facilitating the emerging Orkney Hydrogen Economy



- BIG HIT has developed substantial hydrogen **production/storage infrastructure** and **transport logistics know-how** in Orkney
- This operational experience makes Orkney an ideal and convenient place to test future hydrogen energy system technologies

International partners are supporting work in tidal power-hydrogen integration

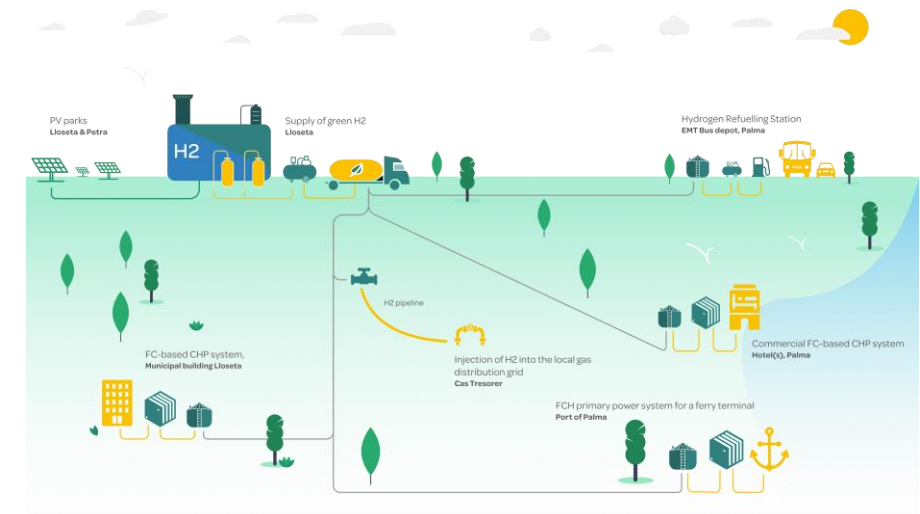
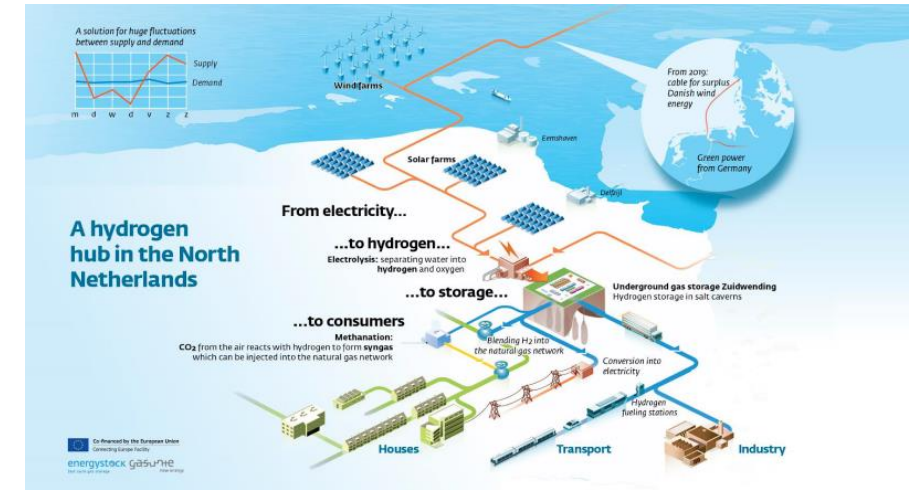
- Our Integrating Tidal Energy into the European Grid (ITEG) project is developing a replicable **Power-to-X solution** for island and coastal settings
- With €11m support from Interreg North-West Europe, 3 technologies are being deployed in Orkney:
 - **Orbital O2 2MW tidal turbine** – **deployed April 2021**
 - **Elogen 500kW electrolyser** – **due Summer 2022**
 - **Energy Management System (EMS)**



ITEG integrated tidal/hydrogen concept

We are also providing technical insight to projects elsewhere in Europe

- We are supporting European projects aimed at **replicating aspects of the 'Orkney Hydrogen Story' elsewhere**:
 - Hydrogen Energy Applications Valley Environments Northern Netherlands, **HEAVENN**, led by the New Energy Coalition with 30 European partners and €20m EU funding (total budget €100m). Building a **hydrogen valley in the Netherlands** with full value chain hydrogen integration.
 - Green Hysland**, Mallorca, led by Enagas alongside 28 European Partners and £10m EU funding (total budget €20m). Developing a **hydrogen ecosystem for Mallorca** using solar-powered electrolysis and hydrogen for power, heat and transport.



Our collaborations also support technology commercialisation efforts



EMEC

- Hydrogen market insights
- Techno-economic study



ECN

- Basic design for open sea prototype testing, including permitting aspects

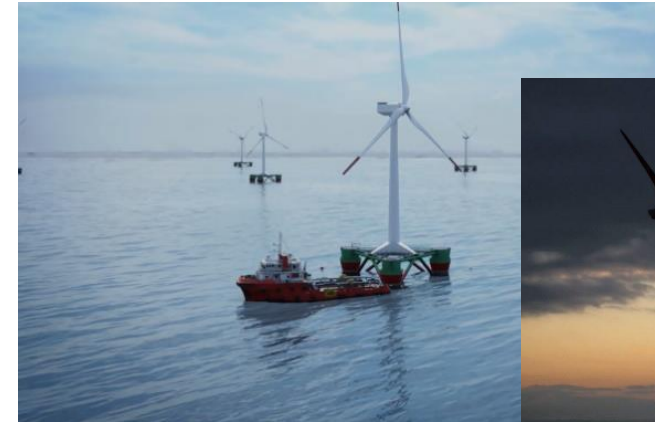


INNOSEA

- Export line and mooring simulation



- **Exceedence** – levelised cost
- **Dolfines** – Business case development



- In our Marine Energy Alliance project we are working with international partners to **support the commercialisation of offshore hydrogen production** solutions from **floating wind**.



Fostering Franco-Scottish collaborations

(as **a model for broader international innovation** to support hydrogen development)

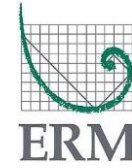
Shared characteristics shape common goals in Scotland and France

- Floating offshore wind and hydrogen represent key growth sectors of **vital importance to decarbonisation efforts** and ambitions in both Scotland and France.
- The Scottish Government recognises the **value of international collaboration** in delivering upon these ambitions, and in addressing technical and logistical challenges within supply chains.
- Scotland and France both have **well developed engineering supply chains** with extensive experience and capabilities in conventional energies; these provide a solid foundation for future work together, to address shared challenges (and opportunities!).



Source: Tractabel Engie, 2019.

Our project was supported by direct engagement with key stakeholders

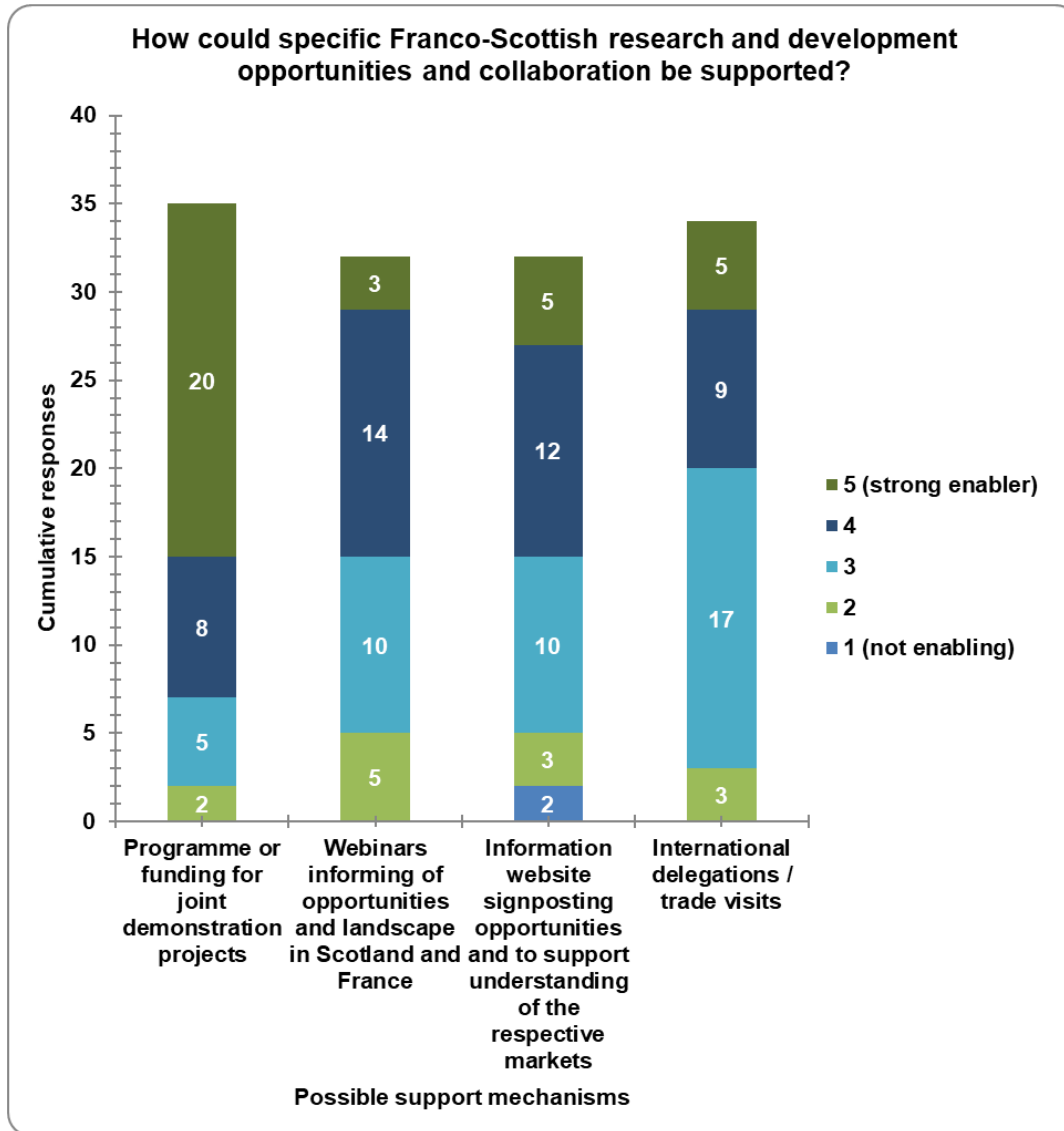


Ambition is high in both countries for integrating floating wind and hydrogen

- However, questions remain over **how, where, when and why** hydrogen should be produced using power from floating wind farms
- This integration should be explored through **demonstration projects**, to better understand the opportunity and challenges



Industry stakeholders are strongly in favour of joint demonstration projects



Number of responses: 35.
Includes 12 responses from Scottish organisations, and 23 from those in France.

Note that this sample is not representative but gives a useful indication of stakeholder sentiment.

We proposed four specific means of supporting Franco-Scottish collaboration



1. Target engagement at regional levels in France.



2. Encourage research collaboration through network building.



3. Develop a research, test & demonstration platform targeting integration.



4. Instil a focus on 'Just Transition' and skills development in all initiatives.





Please download our full Franco-Scottish collaboration report from gov.scot, [here](#)

Thanks very much for listening

