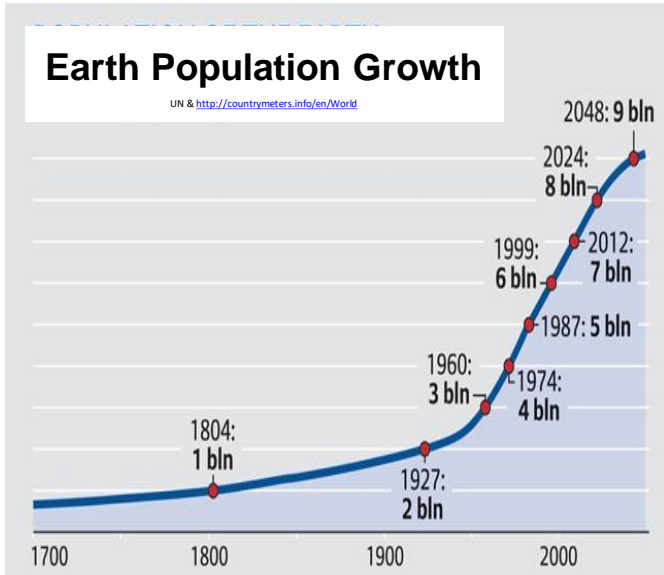


A Changing World...

2010 TOP 20 CITIES BY POPULATION



CH2ange @ch2ange · Apr 11
 #EnergyTransition: we can make the difference, we have the power 🌞
 #hydrogen.



SOURCE: Global Cities Institute

visualcapitalist.com

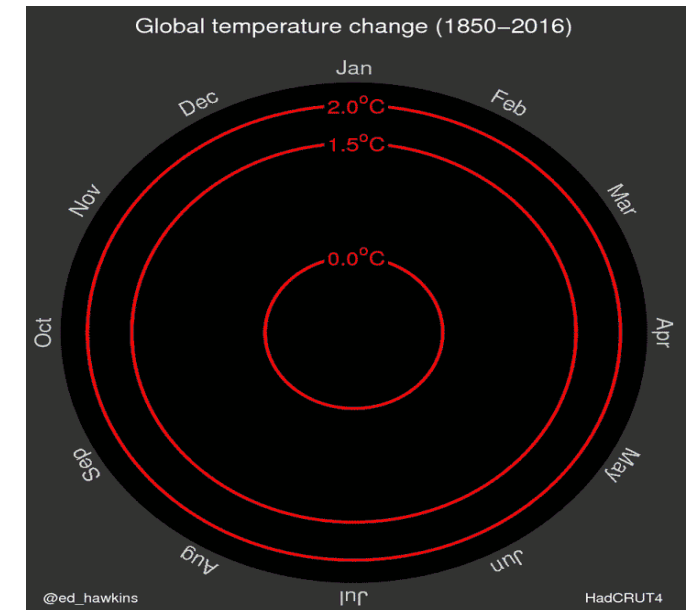


Agriculture / Food

What affect will these have on:

- Resources
- Energy Use
- Transport
- Communities

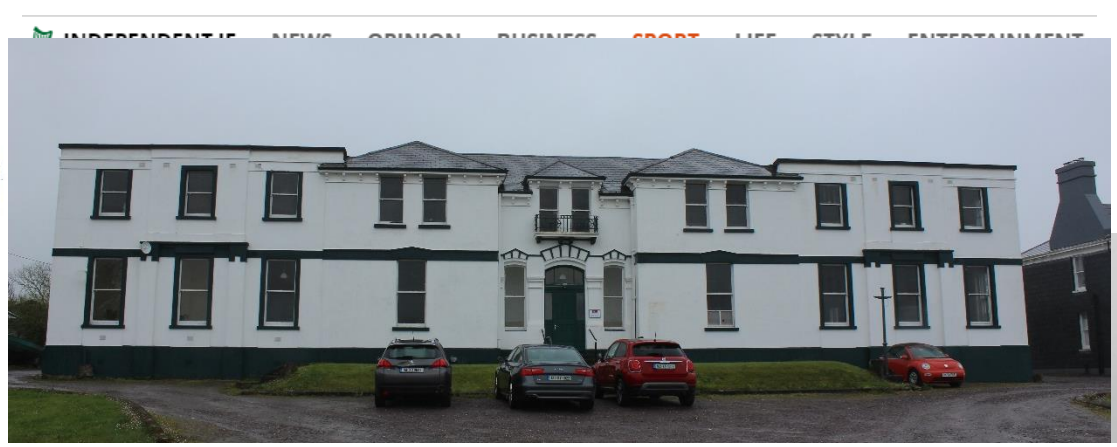
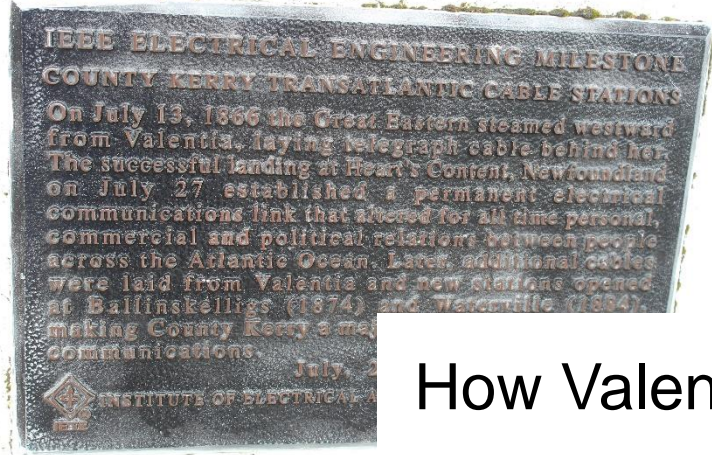
Valentia Workshop - 2019



@ed_hawkins

HadCRUT4

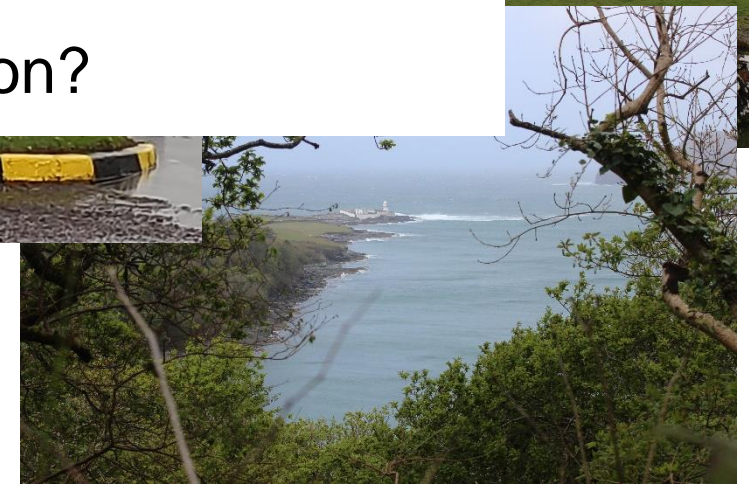
Valentia - A Changing Community...



How Valentia can help enable Irish Communities to make the Energy Transition?



Is Hydrogen part of this transition?



Introduction to Hydrogen (H₂)

Dr James Carton

**Assistant Professor in Energy Sustainability & Hydrogen & Fuel
Cell Technology Development**

Dublin City University

&

World Energy Council FEL Member

&

Hydrogen Ireland Association

James.carton@dcu.ie

DCU

What is Hydrogen?

First element of the periodic table

Simplest & lightest element in the universe

Fuels the Sun for Billions of years

Non toxic, non poisonous

Burns in air

Abundantly available on the Earth in bound within water

Hydrogen Uses

Hydrogen has been used for more than 90 years with an excellent safety record.

Most hydrogen is used to refine crude and shale oil.

Hydrogen's extreme heat and cold help manufacture electronics, metal, and glass.

Hydrogen creates clean electricity and stores energy from renewables.

Hydrogen makes fertilizer, consumer products and food more shelf stable.

Hydrogen binds molecules together in chemicals and pharmaceuticals.

<https://cafcp.org/sites/default/files/hydrogenuse.jpeg>

Why Hydrogen?

Can be produced carbon free

Can be used to store renewable energy

Can be used to produce heat by burning in air

Can produce electricity directly using a fuel cell

When you react or burns in air it produces pure water

Hydrogen can fuel your transport, cars, buses, ferries, heat your homes, cook your food, supply chemicals to local industry

You can produce it yourselves!

Transport Fuel Options



How we power our vehicles:

Technology/Fuel

Pros & Cons

~~Traditional/Fossil Fuel~~

~~Petrol Diesel CNG LNG~~
Health Emissions Fossil Fuels TAX +TRL

Fossil Fuel Alternatives

~~Bio-Ethanol Bio Diesel~~ **Bio-CNG/Bio-Methane**
Health Emissions ~~Fossil Fuels~~ Indigenous? <TAX +TRL

Petrol/Ethanol & Battery Hybrid

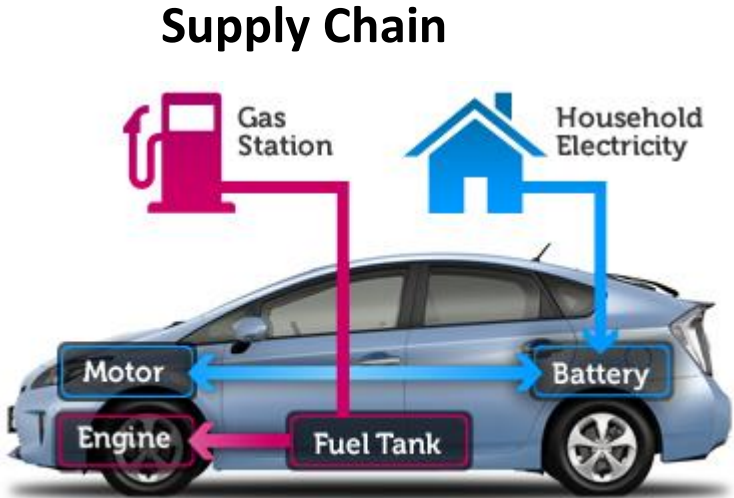
Hybrid Plug-in ~~Hybrid Self Charge~~
Health <Emissions ~~Fossil Fuels~~ <TAX >Efficiency <Running Cost +TRL

Full Electric
Battery Hydrogen

Health Emissions ~~Fossil Fuels~~ TAX >>>Efficiency <Running Cost Indigenous TRL

Hybrid Plugin – Petrol & Battery

Health Emissions Fuel Cost TAX Efficiency Running Cost Indigenous TRL



Companies in Ireland

- Toyota Ireland
- UCD / DCU
- ESB Ecars

Irish Projects

- SEAI incentives
 - Toll
 - Tax
- Buses & Cars

<https://www.toyota.ie/>

Scenario:



2005-2025

Carbon Fuel
Supplemented with
efficient battery
operation in City –
Charged at Night

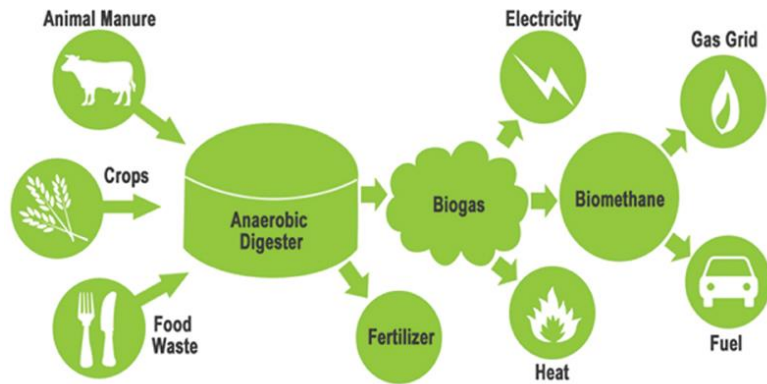
Mixed Rural &
City

Alternative Fuel - Bio-CNG/Bio-Methane

Health Emissions

Fuel Cost TAX Efficiency Running Cost Indigenous TRL

Supply Chain



Companies in Ireland

- Gas Networks Ireland
- Ervia
- UCC / DCU
- Irbia
- Renewable Gas Forum

Irish Projects

- Causeway
- GNI

<https://www.gasnetworks.ie/business/natural-gas-in-transport/the-causeway-project/>

Scenario:



2018-2025

Carbon Neutral Fuel
Bio-Methane from
Waste

Non City
Connections

Full Electric – Battery

Confession...



<http://eaasolutions.com/blogs-news/>

Full Electric – Battery

~~Health~~ ~~Emissions~~ Fuel Cost TAX Efficiency Running Cost Indigenous **TRL**

Supply Chain



Companies in Ireland

- Nissan Ireland
- Hyundai Ireland
- Dublin City University
- UCD
- ESB Ecars

<https://www.esb.ie/our-businesses/ecars/ecars-overview>

Irish Projects

- SEAI incentives
 - Toll
 - Tax
- Buses & Cars

Scenario:



2015-2050+

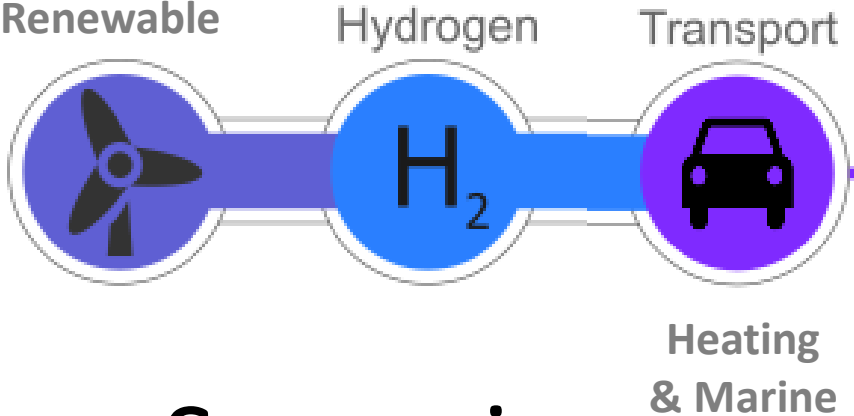
Efficient battery operation in City – Charged at Night

In City Centre

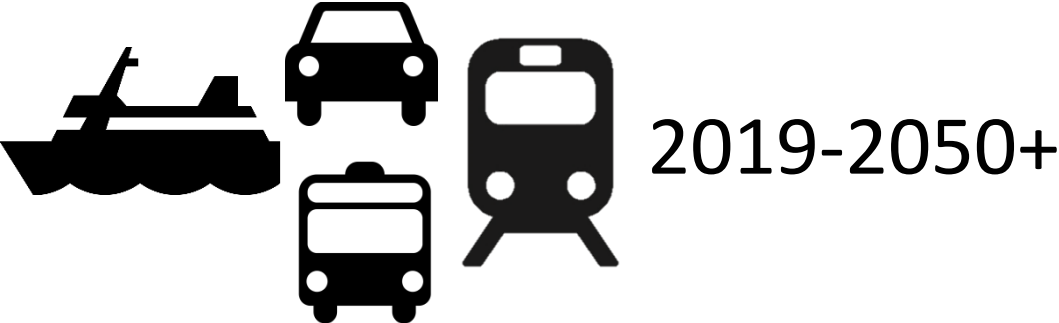
Full Electric – Hydrogen

Health — Emissions — Fuel Cost **TAX** Efficiency Running Cost Indigenous **TRL**

Supply Chain



Scenario:



Companies in Ireland

- WrightBus
- Toyota Ireland
- Hyundai Ireland
- Dublin City University
- NUIG / Belfast Met
- Energia
- Ervia
- Enterprise Ireland

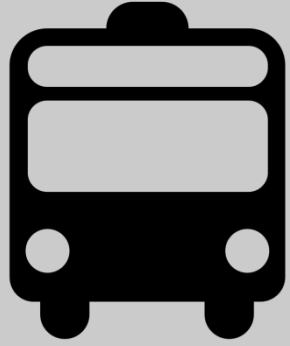
Irish Projects

- GenComm
- SeaFuel
- Ireland H2 Strategy Group
- Hydrogen Ireland
- SmartH2
- Enterprise Ireland

<http://www.nweurope.eu/projects/project-search/gencomm-generating-energy-secure-communities/>

Fast Refuel, Zero emissions, Safe, Low Cost large scale Infrastructure

All Transport



Buses



WrightBus, Ireland



WrightBus & Toyota



Trains



Alstom, Germany



Light Vehicles

Hydrogen-fuelled Toyota Mirai takes to Irish roads

Company wants to promote need for refuelling stations as none currently exist in State

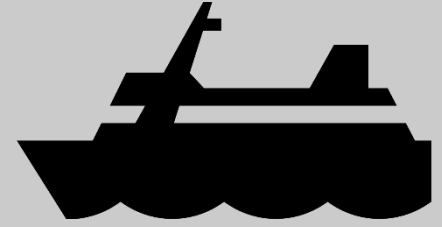
© Fri, Sep 22, 2017, 11:48 | Updated: Fri, Sep 22, 2017, 11:51

Kevin O'Sullivan



The hydrogen-powered Toyota Mirai. Photograph: Aidan Crawley

Toyota, Ireland



Ferries



Norled, Norway



CMB, Belgium

Takeaway Messages:

Before 1866, it took two weeks to send a message to America — afterwards, it was instantaneous.

Before Hydrogen, fossil fuels were burnt releasing emissions— afterwards, there were no emissions...

Kerry was a world hub of engineering, technical, and telegraphic skills.

Kerry can be a world hub of engineering, technical, and energy skills...

“This tetrapod site on Valentia is of international significance as it represents the transition of life from water to land – a momentous turning point in evolution..”

“Valentia can be of international significance representing the transition of energy from fossil fuels to hydrogen (water) – a momentous turning point in our energy transition...”



**The Association for Energy, Mobility, Industry and
Community**

info@hydrogenireland.org



#IrelandHydrogen

Thank You.