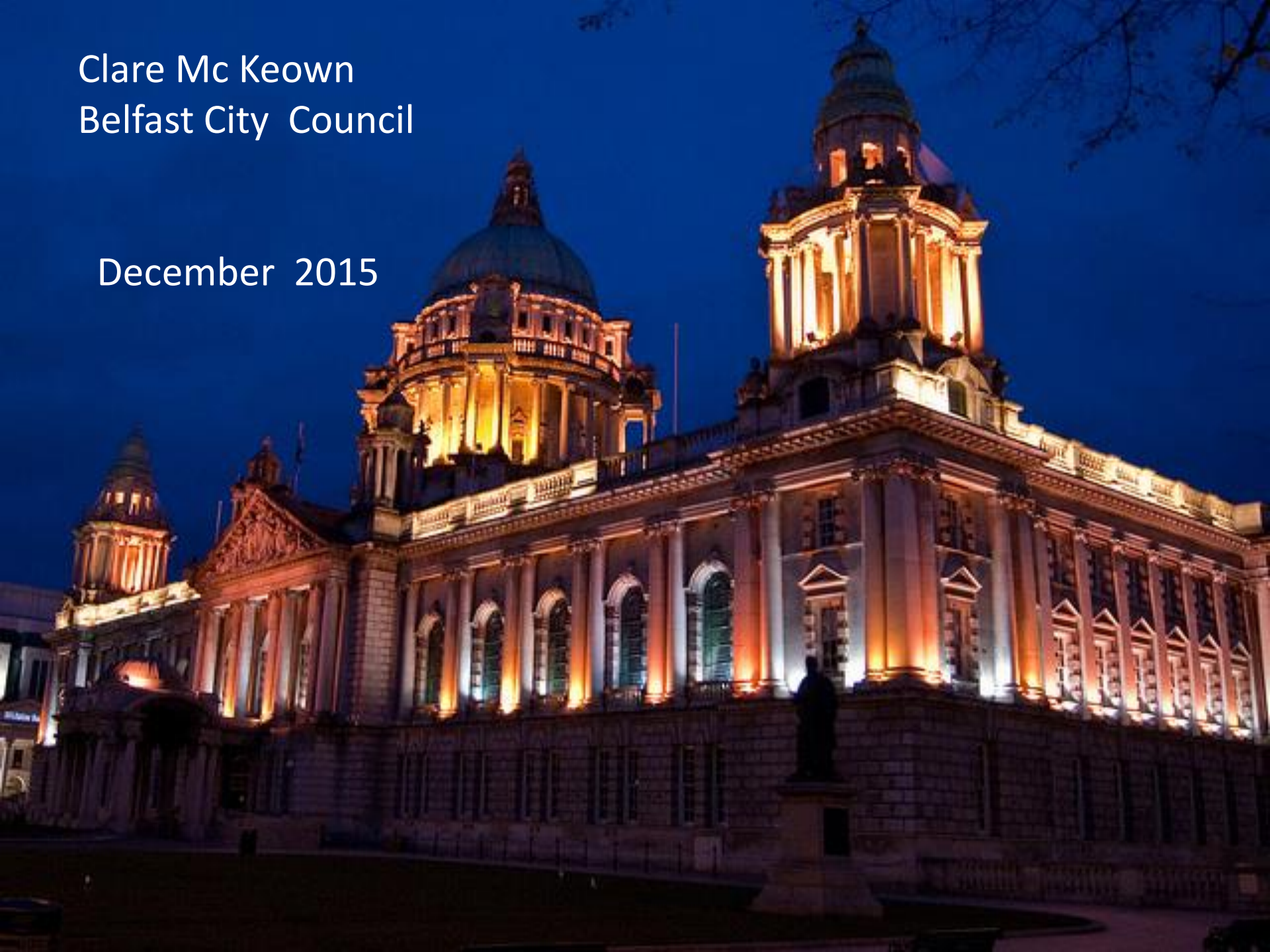


Clare Mc Keown
Belfast City Council

December 2015



Government Policy

Energy

- Climate Change Act
- 80% reduction in GHG emissions by 2050
- 40% electricity from renewable sources by 2020
- 10 % renewable heat by 2020,
- Renewable Obligation certificates
- Renewable heat incentive
- Transport – ULEV's



Renewable Energy

- UK government £100's billions in renewable energy investment .
- £50 million Harbour estate
- Globally , China, USA, South Korea – Green New Deal
- COP 21 – new opportunity
- Poorer countries , opportunity for technology transfer.

DONG



Payback from PV

Finance details	Power
	50kWp (196 x 255kW panels)
Indicative Cost	£58,000
Expected Yield	42,300 units
Annual generation income (4 x NIROCs) guaranteed for 20 years	$42,300 \times \text{£}0.1696 = \text{£}7,174$
Electricity savings (90% of generated solar electricity consumed)	$38,070 \times \text{£}0.15 = \text{£}5,710$
Export income (10% of generated solar electricity exported)	$4,230 \times \text{£}0.0559 = \text{£}236$
Combined income & savings per year	£13,120
Payback period	4 ½ years
Return on investment	23%
20 year returns	£262,400



NICE – Northern Ireland Community Energy

- First community owned energy enterprise.
- Community benefit society
- Providing solar PV panels to charitable and community organisations.
- Use the ROC system to fund investment
- 15 Charities – roofs
- £150 000



NICE

- Offering cheap electricity to building owner
- Dividend to shareholders
- Fuel poverty fund
- Money stays in the community.
- £150 000 raised
- Experienced social entrepreneurs.
- <http://www.nicommunityenergy.org/installations/>





Since 2008, the price of coal has risen 13%.
Solar has **dropped 80%**.

The Future is Bright



Transport



- **Transport – weak transport system**
- **2/3 journeys less than 5 miles. 1/3 journeys are less than one mile.**
- **Emissions from cars greater than emissions from power stations.**
- **GHG emissions twice national average.**
- **China**

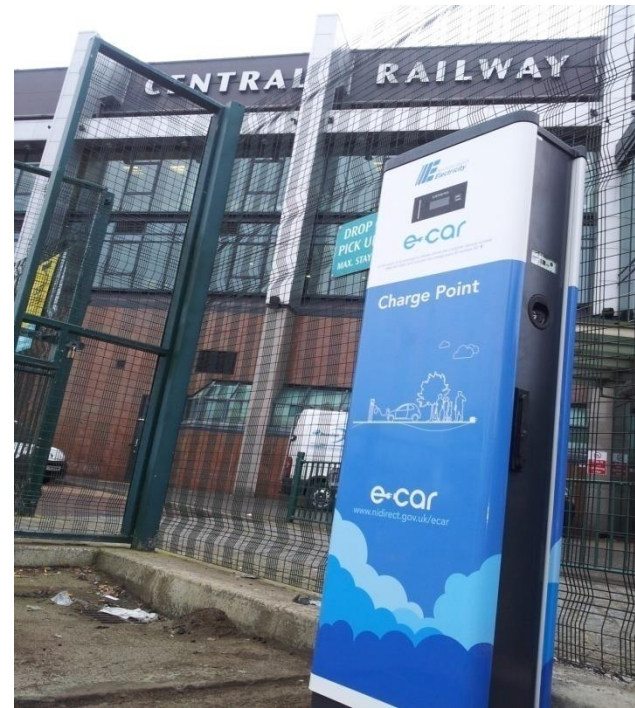


Sustainable mobility

Public bike hire



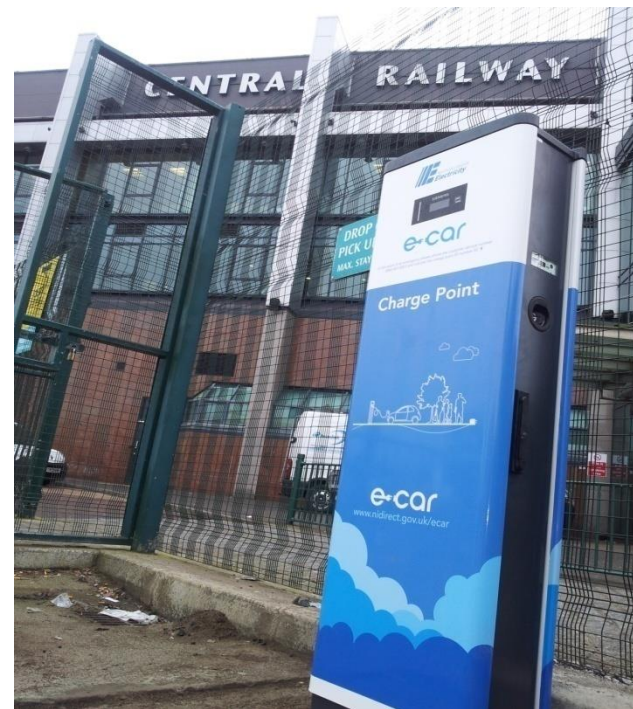
Electric vehicles

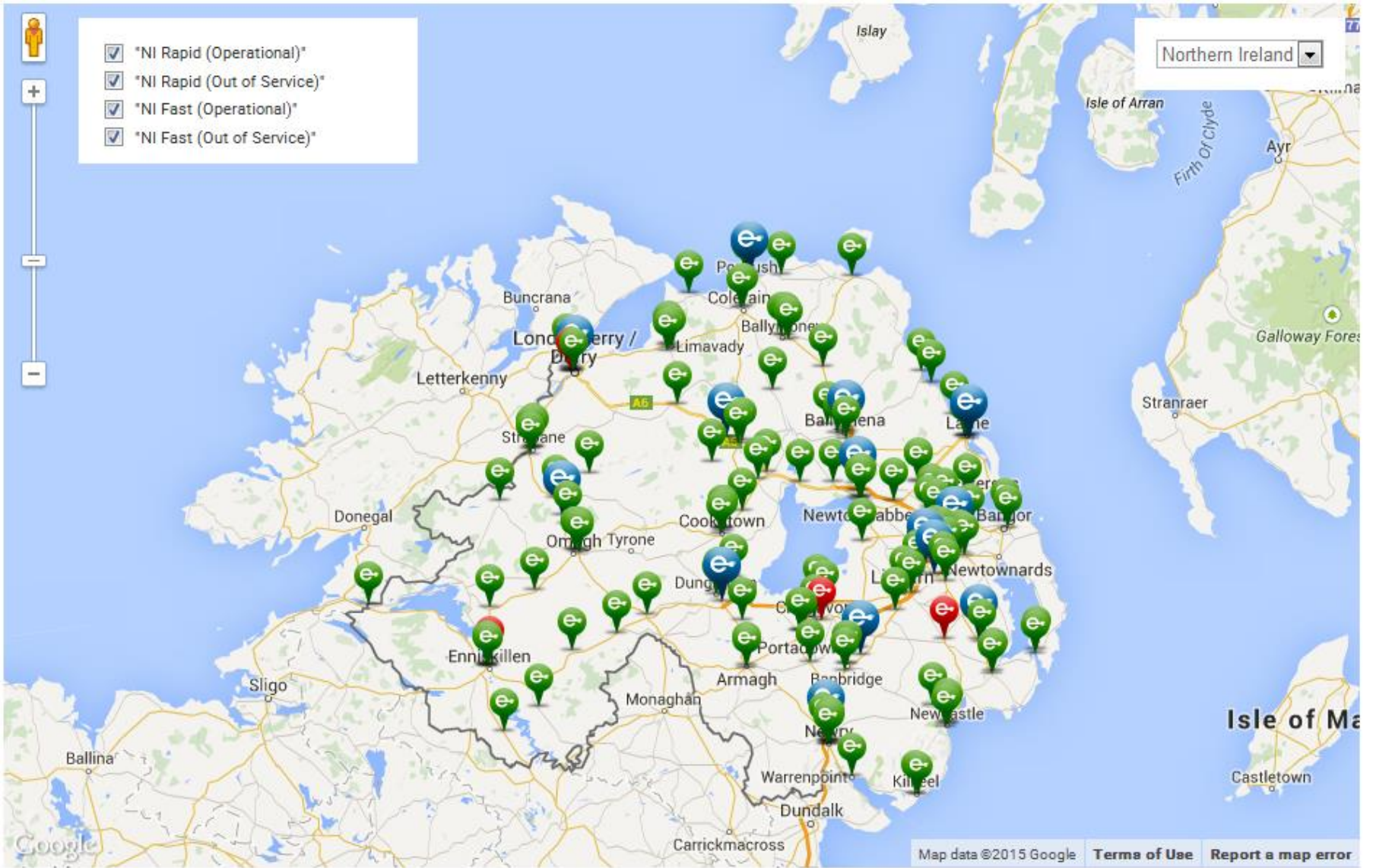


Sustainable mobility

- HMT £500million ultra low emission vehicle fund (ULEV's)
- 75 % grant funding for EV infrastructure.
- 5% all public vehicle sector vehicles will be ultra low emission by 2020.
- BCC have over 300 diesel / petrol fuelled vehicles

Electric vehicles





Electric vehicles

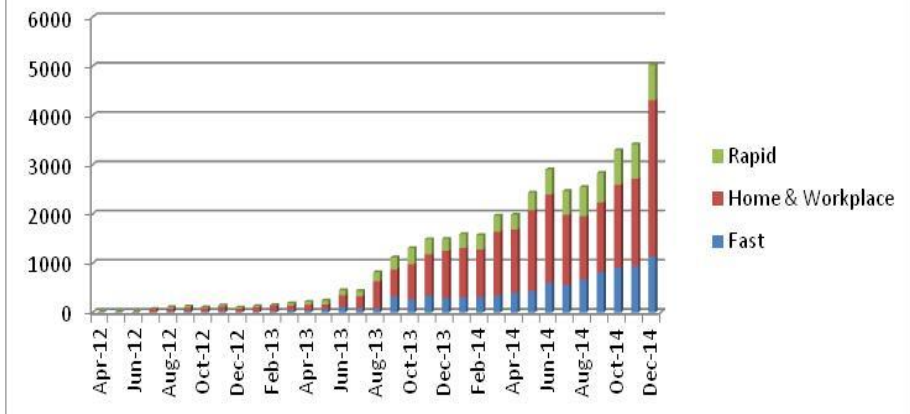
- BCC trail Renault Kangoo, cheaper to run ,zero emissions
- Casing – circuit boards, local jobs, local wealth
- Potential for energy storage.- transformative.
- Digital Overlay , data, movement CO2 emissions



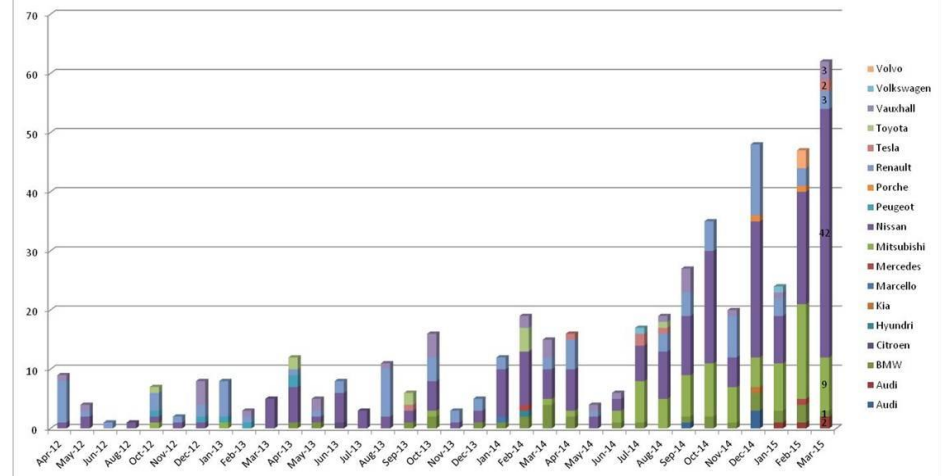
Ecar Operation & Usage

- 334 publicly accessible charge posts in Northern Ireland
- 52,000 home, workplace and public charging events since inception
- Increase in vehicle ownership from 5 in 2012 to almost 600 electric vehicles registered to date
- 64 EV's registered in March 2015 alone

Charging Events



Registrations to 31 March 2015 (by make excl dealers)



£10m - Electric Vehicle bid



transportni



Department for
**Regional
Development**
www.dtrni.gov.uk



Department of the
Environment
www.dtrni.gov.uk

e-carni
Charged for Success



Go Ultra Low

INNOVATE UK – Future City Demonstrator

- Future City Demonstrator competition
- **Smart sustainable city**
- Integration of services, the circulatory economy.
- INNOVATE IOT £10m
- Rockefeller Foundation
100 Resilient Cities

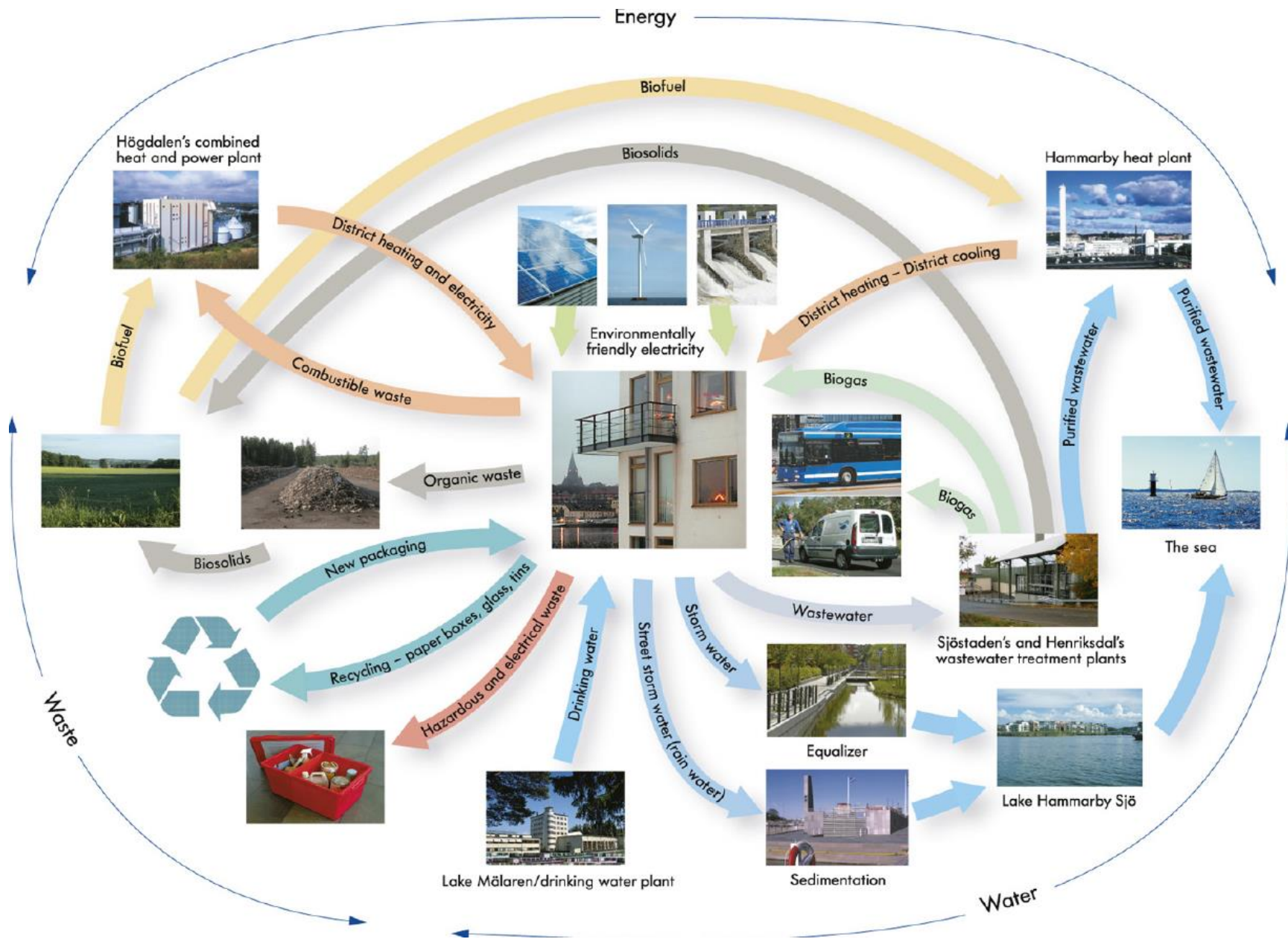


Innovate UK – Future City

Challenge : to develop concepts for the integration of infrastructure for a model 21st century city.

Aim to make large systems energy , waste, water and transport systems more integrated, using digital overlay.

Partners – Belfast City Council, Invest NI, Queens University



Energy

Biofuel

Biosolids

Environmentally friendly electricity

Biogas

Biogas

Wastewater

Equalizer

Sedimentation

Water

Högdalen's combined heat and power plant



Hammarby heat plant



District heating and electricity

District heating - District cooling

Combustible waste

Organic waste

Biosolids

New packaging

Recycling - paper boxes, glass, tins

Hazardous and electrical waste

Drinking water

Street storm water (rain water)

Storm water

Wastewater

Equalizer

Lake Hammarby Sjö

Sjöstaden's and Henriksdal's wastewater treatment plants

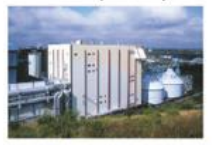
The sea

Purified wastewater

Purified wastewater

Waste

Lake Mälaren/drinking water plant



Innovate UK

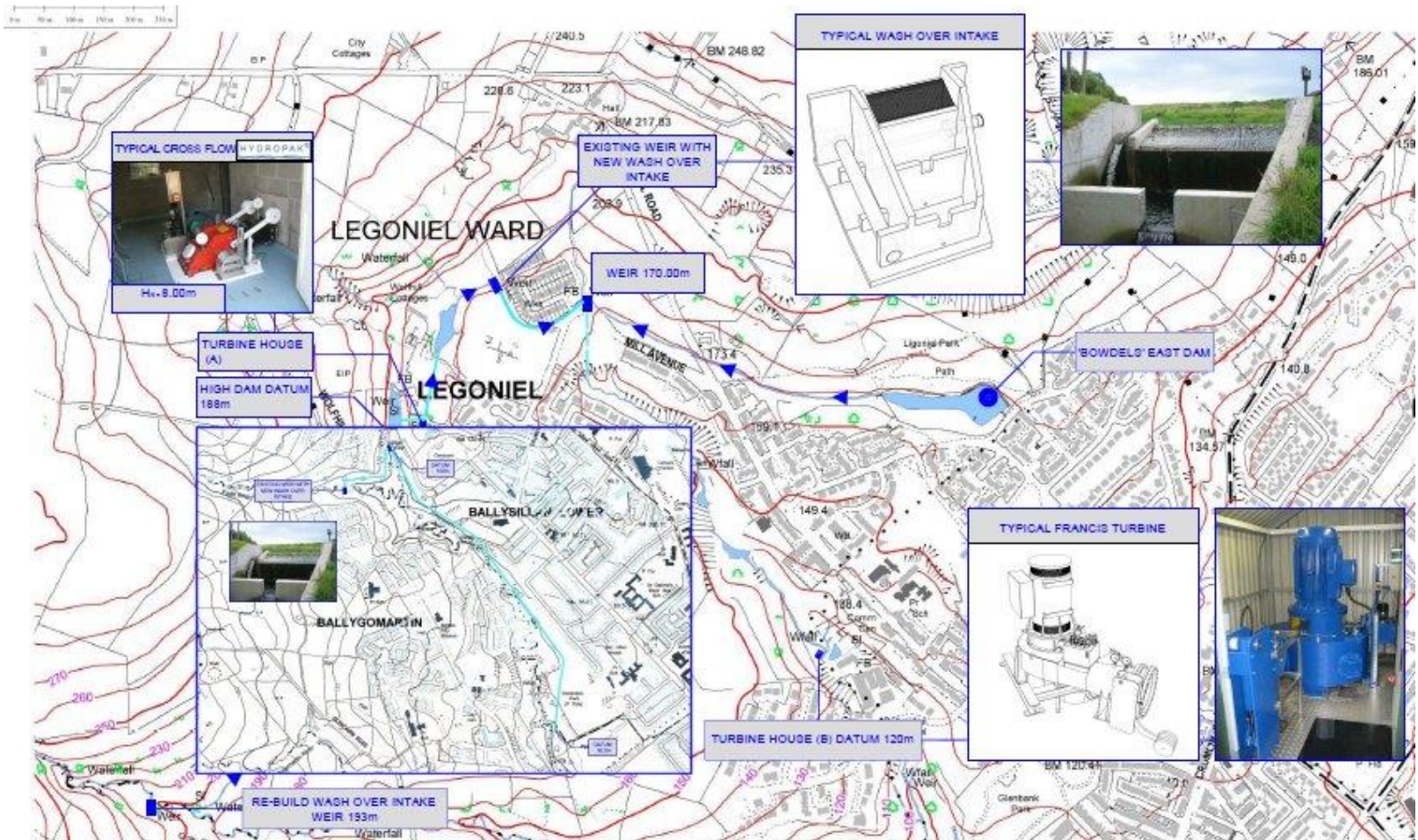
- Use of redundant assets to generate low carbon communities ?
- Waste heat landfill - £1m
- Hydro dams
- Community biomass chp
- Open Source data portal
- Growing local Food
- £50 000 to develop concepts



Ligoniel Community Dam



3 Generator sites

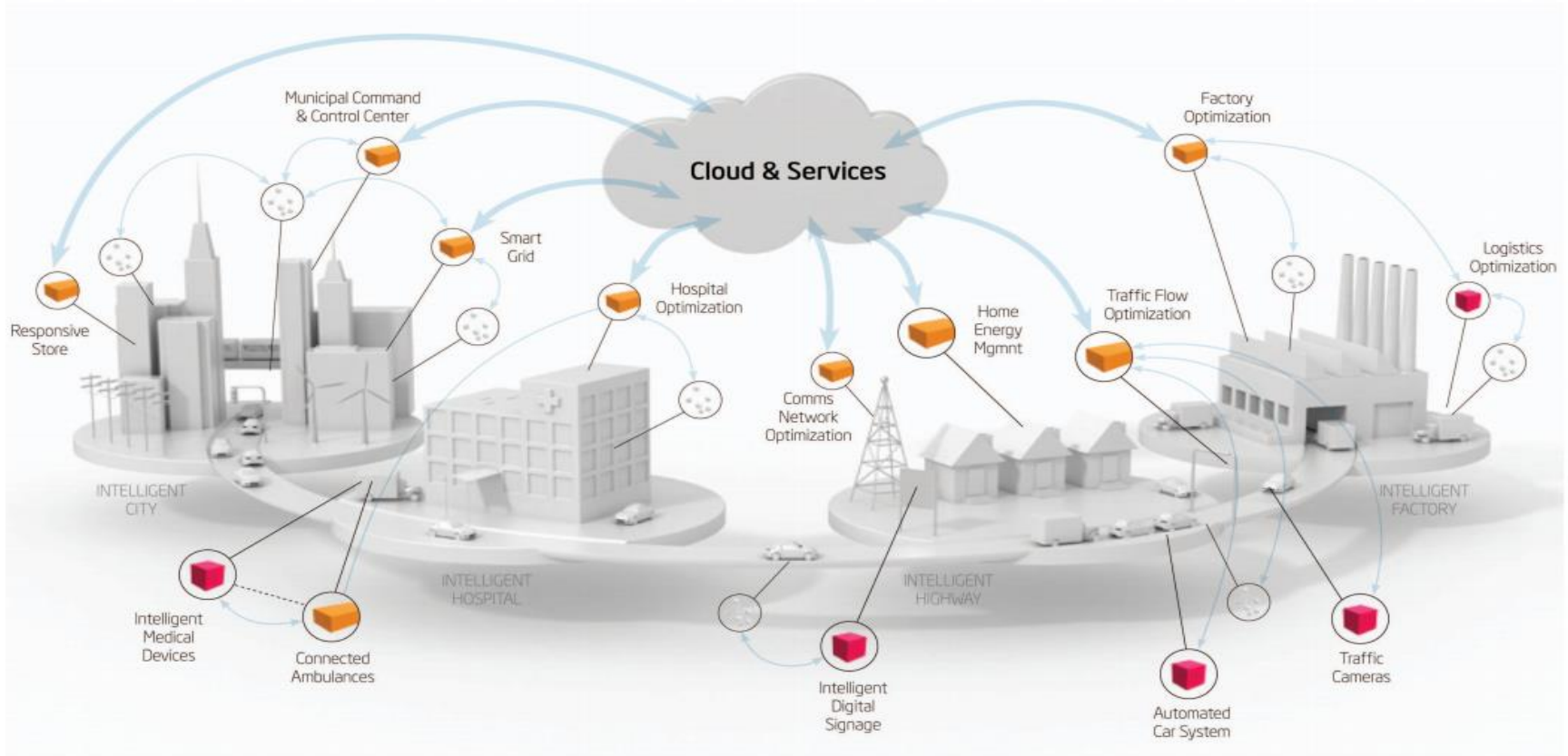


Solutions

- Landfill site - £300 000 R and D project, CASE , INVEST NI.
- Hydro dams - SIF ,
- Open source data portal
- £10million IOT bid.
- Food project – Belfast Food Network £60k local food. Sustain Esmee Fairbairn Trust.



Internet of Things



Conclusions

- Growth Knowledge Economy
- Energy / Sensors
- Data Information
- Data Analytics
- Mobile technology
- Remote monitoring, health , transport, energy .
- IOT prevalence



Croke Park – IOT Test bed

MINI CITY

Research project INTEL , GAA, DCU

Noise sensors

Crowd movement - CCTV

Dispersal patterns

Lighting

APPS for queing etc

Flood Monitoring

On Pitch

Pitch monitoring

Grass growing

Players

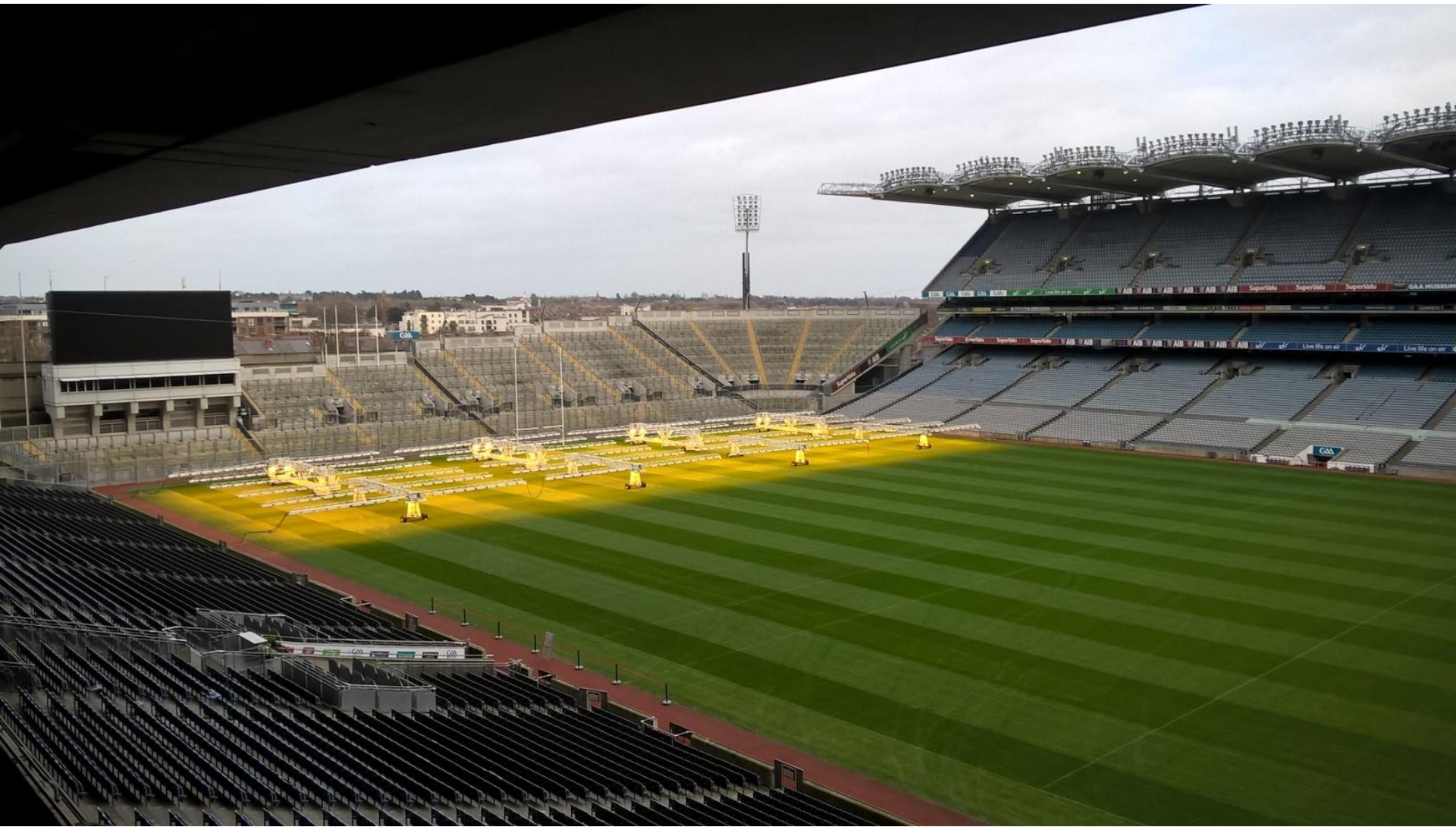
Movement sensors

GPS tracking

Respiratory rates







Third Industrial Revolution

Transformative changes in

- **Energy** – renewable energy produced locally , smart grids, demand management EV's.
- **Communication** , internet WIFI enabled technology, devices talking to devices, social media , speed.
- **Finance** - no longer talking just to banks, crowding fund etc made accessible through internet.