



CH2F

You are Invited !

to the launch of the CH2F
 Community Hydrogen Forum

in Dublin City University on
 October 21st 2019 at 10am

CH2F

***“Hydrogen Technologies are definitely the way ahead”
 - Lord Provost***

The Pure Energy Centre hosted the 9th GenComm partner meeting on 11th and 12th June 2019 in the European Energy Capital in Aberdeen.

On 11th June a full day was reserved for the Gencomm Partners. This meeting involved a whole day of discussions within the partnership, including updates and roadmaps for the next six months.

“It was a constructive and highly reflective day”, said Paul McCormack, Programme Manager of Gencomm representing Belfast Met. He added: “The partners are working hard in order to ensure the best outcomes from the project and I can safely say that we have an excellent spirit of collaboration in the partnership.”

On 12th June a Green Hydrogen Public Seminar was organised by the Pure Energy Centre. This public event was well attended and attracted a variety of speakers. The seminar was opened by Councillor Barney Crockett, Lord Provost, Speaker of Honour, Aberdeen City Council, President HyER (European Association for Hydrogen and fuel cells and Electro-mobility in European Regions).

Lord Provost Barney Crockett said that he was convinced that Hydrogen Technologies are definitely the way ahead and he spoke about various projects involving Hydrogen Valleys, Heating and Maritime. He added: “It is great to see how more and more hydrogen projects are catching on. Gencomm is a well-organized project that will surely give its contribution to a greater integration of hydrogen and will contribute to increasing citizens’ awareness of this powerful energy carrier.”

Other speakers included Alan James, Managing Director, Pale Blue Dot who spoke about Hydrogen CCS. Christopher Pearson of the Oil and Gas Technology Centre also spoke about “Parallel paths to Hydrogen, opportunities and the future of integrated energy”. Angus McIntosh, Director Future Energy with the Scottish Gas Network presented on “Hydrogen Vision” and the final guest speaker was Frank Roach, Partnership Manager of HiTrans who gave a talk on “Hydrogen Trains”.

In the second part of the sessions, Richard Brough, Development Manager, spoke about a unique opportunity, Hydrogen Eco-Home,

which uses Pollywood natural technology. Dr. Venkatesan Krishnan, Senior Lecturer, Hydrogen and CCUS, Laboratory research to commercial technology at Teesside University described their work on taking novel hydrogen technologies from the laboratories to the commercial world and how the university is successfully defining new frontiers in this area.

Each Project Partner then had the opportunity to give a short presentation on the work that they are undertaking within the Gencomm Project. After a quick lunch a tour of the Aberdeen Bus Project took place, Gencomm Partners visited the Aberdeen Hydrogen Bus Project site.

The project is cofounded by High Vlo City and Fuel Cells and Hydrogen Joint Undertaking (FCHJU). The project which consists of 1 MW H2 Plant, including H2 Production, buffer, compression, storage and dispensing system, is able to refill a fleet of 10 hydrogen buses.



From left: Dr Daniel Aklii, CEO of Pure Energy Centre, Councillor Barney Crockett, Lord Provost and Paul McCormack, Innovation Manager of Belfast Met



GenComm partners at Aberdeen Bus project station

The visit consisted of two different parts: a powerpoint presentation of the Aberdeen Hydrogen Bus Project with all the technical data of the plant followed by a tour of the hydrogen plant with a local guide.

Dr Daniel Aklil, CEO of Pure Energy Centre that hosted the two days meeting said: "It was a very positive meeting. Local authorities have welcomed the project and important ideas have emerged for future collaborations. We are all working well and the project is moving towards its final phase. We hope this project is a pioneer in the development of large-scale hydrogen."

Elizabeth Johnson, Pure Energy Centre, Scotland

Formation of a Group to Coordinate the Introduction of Hydrogen Fuel Cell Transport in Ireland

Hydrogen Mobility Ireland (HMI) is a recently formed coalition of leading industrial stakeholders with a strong interest in the deployment of hydrogen mobility, working alongside relevant public sector policy stakeholders.

By February of this year HMI had a core of 11 Commercial company members and four policy stakeholders (see panel below). The group set out to spend six months developing a strategy paper and have retained leading international consultants, Element Energy, to this end. We intend to deliver this paper in quarter three of this year.

Mission of HMI

Our mission is to plan a path to the mass market introduction of these vehicles so that they contribute on a meaningful level to Ireland's transport mix. In doing this, the group expects to realise several benefits for Ireland: making a significant contribution to decarbonising transport; improving energy security through local production of hydrogen; creating economic value through enabling new industries for the production and distribution of hydrogen as well as through its use in vehicles.

Specific Aims

- Create the conditions to facilitate the production of low carbon hydrogen for use in transport
- Facilitate the rolling out of hydrogen refuelling infrastructure on a national basis
- Enable the introduction of FCEV transport across various vehicle categories

Mark Teevan, initial Chairperson of Hydrogen Mobility Ireland



Energia to invest €3billion in Renewable Energy

GenComm partner Energia hit the headlines in early July when they announced they planned to invest more than €3 billion in renewable infrastructure over the coming five years.

Energia said its infrastructure investment will create an additional 200 jobs at the group in addition to an estimated 3000-5000 construction jobs over the course of the five years.

The projects it plans to focus on include onshore and offshore wind farms, solar power, hydrogen fuel generation and bio energy facilities.

Taoiseach Leo Varadkar welcomed the announcement, saying: "Under the government's Climate Action Plan, we want to increase the amount of energy produced from renewable sources from the 30 per cent we produce today to 70 per cent by 2030. To do this, we need industry to step up to the mark. I commend Energia group for announcing this €3 billion investment in a range of renewable energy projects, from wind farms to bio-energy

which will help us to reduce greenhouse gas emissions, give us clearer air and reduce the need for expensive fossil fuel imports."

Energia Group CEO Ian Thom, said: "Our decision to invest over €3 billion in renewable technology and energy infrastructure in the coming years is a clear signal of our intent to build on our continuous commitment to Irish communities, the economy and the sustainability of Ireland's energy supply while contributing decisively to decarbonisation and the protection of our domestic and global environment."

Minister for Communications, Climate Action and Environment, Richard Bruton, said: "Decarbonising our electricity supply is crucial to all the changes we are making as we make the transition away from fossil fuels. This investment by Energia, will boost Ireland's capacity, with over €3 billion being invested in onshore and offshore wind, solar, hydrogen fuel generation and bio energy facilities."

Utility Regulator Points to Exciting but Challenging Times Ahead for Energy

Our energy system is going through a radical transition involving a scale and pace of change we have not seen for over a century. At our recent energy strategy seminar with the Northern Ireland Energy Institute, Dieter Helm called it, "a revolution!" The questions is, are we ready for revolution?

Energy transition is about new and changing patterns of both energy supply and demand, as we transform from carbon-based fossil fuel systems to a low carbon future. It will see the current fossil fuel sources giving way to an energy system based on renewable energy. It will also see technology play more of a role in terms of storage and consumer choice. As the Utility Regulator, we must make sure that the energy system in Northern Ireland is secure, accessible, sustainable and affordable for all energy consumers.

We do know some of what is coming as part of this revolution. The way we heat our homes and fuel our transport will need to change in order to meet climate targets, including the UK Government's recently announced ambitious target of net zero carbon emissions by 2050.

The Utility Regulator is playing its part in facilitating the energy transition. Our new Corporate Strategy set out our vision for the future by enabling: (a) 21st century networks and (b) a low carbon future. In achieving this, we must be mindful of the short and long-term interests of consumers and that is why protecting and empowering consumers is at the heart of our strategy and must also be central to the energy transition.

The majority of consumers only think about their energy use when their electricity or gas bill goes up or down, or when their lights go out. We want future energy consumers to be able to play a more active role in how, and when, they use energy, facilitated by technology and available choices.

However, all energy consumers need to be protected, particularly the more vulnerable and those who cannot, or chose not to, actively participate in the energy transition. We do not want to leave anyone behind or make anyone worse off – it must be a 'just' transition for all.

Our existing energy frameworks, policy and regulation need to be fit for purpose for this radical transition. Important decisions on our future regulatory pathways need to be taken. For example, how we fund and charge for our energy infrastructure; how our licenses and codes need to change to facilitate new technologies and business models and how we create an optimal integrated whole energy system. By this we envisage a system not just about electricity and gas, but also clean energy in all its different uses, for example heat, power and transport, and its integration, to deliver value for our consumers. These regulatory decisions are also likely to contribute to wider benefits such as new economic opportunities, a cleaner and healthier living environment in Northern Ireland and initiatives that will positively impact on global climate changes.

We are preparing for the revolution. Making the energy transition happen requires co-operation and collaboration, and we stand ready to work with energy consumers, policy makers, the energy industry and others to ensure that we maximise the benefits of the transition for all.



Jenny Pyper, Utility Regulator
Chief Executive

GenComm Partner Authors Methanation Paper

Members of staff at GenComm partner INSA Rouen have recently authored a paper, 'Remarkably Stable and Efficient Ni and Ni-Co catalysts for CO₂ methanation'. Isabelle Polaert, INSA, explains further a new positive for the energy world:

One of the most serious issues in the climate debates and the countries' agreements is focused on the continuous increase in CO₂ emissions.

CO₂ emissions control remains a key point for the future and objectives set in those agreements still need to be targeted. The main objective is the reduction of earth's temperature and CO₂ emissions through the promotion of renewable energy sources. The European commission has prospected a target of 20% renewable energy by 2020 in its "Energy Roadmap 21".

Recent agreements are pushing the countries for the use of renewable energies alongside the fossil energies, which would be substituted by the renewables at mid-term. The renewable energy resources, such as wind, solar, hydrothermal and hydraulic energy are converted to electricity, because the transport of energy is the easiest in this form.

One of the major challenges in the coming years is to find large capacities and a long term solution to store the surplus electricity. The current storage technologies, including pumped-storage hydroelectricity (PSH)—the most massive storage technology available—can store only limited amounts of energy over a short period of time. In this context, hydrogen can be obtained by the electrolysis of water, which can store large quantities of electrical energy in form of hydrogen and oxygen. These two molecules can be used directly or as intermediates in the chemical reactions to either reproduce energy or synthesize chemical products.

Meanwhile CO₂ methanation uses the hydrogen produced by water electrolysis and CO₂ for further production of methane. CO₂ methanation still needs to be improved in terms of process efficiency, reactor design and catalyst design. Therefore, our main objective is to contribute to the catalyst design improvement through the development of an efficient Ni or Ni-Co based catalyst with high stability and resistance to deactivation for further utilization in the industrial application.

The use of the efficient catalysts, prepared in this work will allow performing the CO₂ methanation reaction at relatively low temperatures and lowering the overall process energy consumption.

Dr Isabelle Polaert, Associate Professor, Dept MRIE,
Insa de Rouen



Isabelle Polaert

GenComm Partner NUIG Participates at the ECOS Conference

One of GenComm's outputs is to establish an online tool that shows the potential of hydrogen production across Northwest Europe. NUIG investigate and analyse multiple scenarios of hydrogen demand. Hydrogen can be supplied as a zero emission fuel for transportation and heating.

In terms of heating demand, a study on renewable hydrogen supply to partially substitute natural gas in Ireland has been completed. I published this work at the 32nd International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS) from 23rd to 28th June 2019 in Wroclaw, Poland.

The study focuses on the hydrogen production that is located at each wind farm in Ireland. In the future, it is essential to evaluate a hydrogen production hub as well as integration with any other renewable source to escalate production capacity and reduce its operational cost.

The ECOS conference showed multiple hydrogen studies with a wide-range of production methods and application. Moreover, ECOS provided valuable lectures from various keynote speakers. Professor George Tsatsaronis, from the Institute for Energy Engineering at Technical University of Berlin in Germany, mentioned one instrument that can push carbon-free fuel like hydrogen to come into the energy system by having the right carbon price. Meanwhile Dr. Alicia Valero, from the Research Centre for Energy Resources and Consumption (CIRCE - Institute) at University of Zaragoza in Spain, questioned the sustainability of energy storage

technology like the battery, due to the higher content of rare material, the lower potential of recyclability there is. This opens the opportunity of hydrogen even more to be a sustainable energy storage. Additionally, to achieve a larger share of renewables, Prof. Henrik Lund, from Department of Planning at Aalborg University in Denmark, emphasised the importance of the renewables supply for district heating, which also can potentially be sourced from renewable hydrogen.

Tubagus Aryandi Gunawan



Tubagus Aryandi Gunawan, PHD research student, mechanical engineering, NUIG

IZES gGmbH SWOT Analysis Between Battery Electric and Fuel Cell Electric Vehicles

A major problem facing the world today is global warming. There are many contributing factors to global warming but one of the largest is carbon dioxide emissions (CO₂), which is the most abundant greenhouse gas in the atmosphere.



From left: the Hyundai Ioniq (BEV) and the Toyota Mirai (FCEV)

Regarding this problem there is a debate currently in the scientific community concerning the transition from fossil to renewable energy powered alternative mobility concepts in order to reduce carbon emissions caused by the transportation sector. Our planned paper presents two alternate drive and supply or powertrain concepts of the transportation sector of the future: Battery Electric Vehicles and Fuel Cell Electric Vehicles. A detailed analysis is used to examine the strengths; weaknesses, opportunities and threats (SWOT) of different parts of each vehicle and respective refuelling or recharging stations.

Dr. Bodo Groß, IZES gGmbH

A standing invitation to all our Open Meetings!

- 21 Oct 2019..... NUIG - DCU - Launch of CH2F (Dublin City University)
- 11 Dec 2019 ENSICAEN (France)
- 11 Mar 2020..... IZES (Germany)



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