

National Center for Hydrogen & Fuel Cell

Romanian Association for Hydrogen Energy

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**Insights, perspectives and recommendations
for a hydrogen economy
in Romania and East Europe**

Ioan Iordache, Ph.D.

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Insights, perspectives and recommendations for a hydrogen economy in Romania and East Europe

I. Iordache¹, D. Schitea¹, I. Stefanescu¹, A. Marinoiu¹, G. Badea²

¹National Research and Development Institute for Cryogenics and Isotopic Technologies ICIT, Rm. Valcea, Uzinei No. 4, Romania, tel: + 40250732744,

² Technical University of Cluj-Napoca, Faculty of Building Services, Bd. 21 Decembrie 1989, No. 128-130, Cluj Napoca, Romania, tel: +4 0264 202 509.

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The present work illustrates the situation of Romanian and East Europe's research, development and innovation into the field of hydrogen and fuel cell in the European context. The aim of this study is to exemplify the proposals and projects in which the Romanian hydrogen community is active at European level and a snapshot within East Europe. The authors made an enumeration of Romanian's hydrogen and fuel cell initiatives and projects followed by brief comments, without pretending to make a critical and multidisciplinary analysis. The authors believe that an analysis of the efficiency of the R&D system from Romania and East Europe is more complex and cannot be analysed only during one or two conferences, but a continue dialog and active actions can improve the actual stage of cooperation between stakeholders.

Romanian Association for Hydrogen Energy

* is non-profit organisation, www.h2romania.ro.

National Center for Hydrogen & Fuel Cell

*National Research and Development Institute
for Cryogenics and Isotopic Technologies ICIT, Rm. Valcea

ROMANIA

ROMANIA
Judecătoria RM. VALCEA

Donor nr. 8165/2806/2012
Data 21 septembrie 2012

CERTIFICAT
de înscrisere a persoanei juridice fără scop patrimonial
Nr. 33 din data de 19 septembrie 2012

1. Denumirea : **ASOCIAȚIA PENTRU ENERGIA
HIDROGENULUI DIN ROMÂNIA**
Modificare:

2. Sediu : **Rm. Vâlcea, Uzinei nr. 4, jud.
Vâlcea**
Modificare:

3. Durata de funcționare : **nedeterminată**
Modificare:

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5.

Judecătoria RM. VALCEA



ROMÂNIA
MINISTERUL ECONOMIEI ȘI FINANTELOR
AGENCIA NAȚIONALĂ DE ADMINISTRARE FISCALĂ
CERTIFICAT DE ÎNREGISTRARE FISCALĂ

A Nr. 0677695

denumire/nume și prenume
CIAȚIA PENTRU ENERGIA HIDROGENULUI DIN ROMÂNIA

scăd fiscală: **JUD. VÂLCEA, MUN. RÂMNICU VÂLCEA,
STR. UZINEI NR. 4**

Emisiei: Codul de înregistrare fiscală (C.I.F.): 267000094
Data atribuirii (C.I.F.): 26.09.2012
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Cod N.E.E. 14.13.30.192

Se utilizează începând cu 01.01.2007



Hydrogen and fuel cell R&D in Romania

Romanian Hydrogen and Fuel Cell Technology Platform 2004-5

Public institutes/universities

1. National R&D Institute for Cryogenic and Isotope Technologies - Rm. Valcea
2. National R-D Institute for Electrical Engineering-Advanced Research, ICPE-CA, Bucharest;
3. National R-D Institute for Materials Physics, Bucharest-Magurele;
4. National R-D Institute for Isotopic and Molecular Technologies - ITIM, Cluj-Napoca;
5. National R-D Institute of Technical Physics - IFT, Iasi;
6. Petroleum and Gas University, Ploiesti;
7. University Politehnica Bucharest;
8. "Ilie Murgulescu" Chemistry-Physics Institute of Bucharest;
9. University of Bucharest;
10. "Ovidius" University of Constanta;
11. University of Craiova.

Private Companies:

ZECASIN SA Bucharest;
ICEMENERG SA Bucharest.

Hydrogen and Fuel Cell R&D in Romania:

There is not a special program in order to finance H&FC research, development or implementation.

Main financial support is assured by "*Minister of education and research*", other ministers like: economy, transport, development, etc, do not finance R&D projects.

From our estimation Romanian research authorities "spend" for H&FC approximate 23 million Euro from 2000.

In Romania there are approximately 50 public universities and a little more than 50 research institutes. However, only 10 - 15 of them are involved constantly in the field of hydrogen and fuel cell.

Scopus: little over 100 works (articles and reviews) in the field of fuel cell and hydrogen energy, from Romania. As an overview, Romania is positioned somewhere in the middle of the ranking if we make a comparison with Eastern Europe. Countries such as Russia, Turkey and Poland have more than 300 scientific papers in this field, Greece and Austria with more than 100 scientific papers; Hungary, Czech Republic, Ukraine and Bulgaria are presented with a small proportion, less than 50 articles per country. *Taking into account some errors of interpretation, it is difficult to say an exact number of works, but the text say something about scientific activity in this part of Europe.*

National Center for Hydrogen & Fuel Cell in Romania

- **Working with hydrogen since the 90s, *National R&D Institute for Cryogenic and Isotope Technologies - Rm. Valcea***
- **National Center for Hydrogen and Fuel Cell – created in 2009**

Objectives:

- **Promote excellence in fundamental and applied research**
- **Provide support for development of applied technologies and models**
- **Advice and support for authorities regarding RES and hydrogen**
- **Support in training activities for students and young researchers**



National Center for Hydrogen & Fuel Cell in Romania

National R&D Institute for Cryogenic and Isotope Technologies - Rm. Valcea



RM. VALCEA
(city)



Scientific & technological solutions that work for your business.

TRANSITION TOWARDS HYDROGEN SOCIETY IS AT YOUR DOOR.

R&D directions

HYDROGEN SUPPORT SOLUTIONS

- > LARGE POSSIBILITIES FOR DEMONSTRATIONS AND LEARNING ACTIVITIES.
- > ROOMS FOR CONFERENCES AND DISCUSSIONS.
- > PROFESSIONAL STAFF FOR TECHNICAL AND SCIENTIFIC SUPPORT.



HYDROGEN PRODUCTION TECHNOLOGIES

Goal: to investigate, develop and/or implement low-cost and efficiently high-purity Hydrogen production technologies from diverse sources, putting in the forefront renewable source.

The Hydrogen production group is planned to develop and implement technologies for producing hydrogen in a distributed manner from natural gas and by water electrolysis, but also it is developing centralized renewable production options that include water electrolysis integrated with renewable power (e.g., wind, solar, hydroelectric, geothermal), solar-driven high-temperature thermochemical water splitting cycles, direct photoelectrochemical water splitting, and biological processes.



FUEL CELL DESIGNING, TESTING AND TECHNOLOGY VALIDATION

Our experience achieved in the last years in designing single cell PEM fuel cell or small PEMFC stacks later, was a good basis to approach new and more complex project in this area. It is the foreseen task of the cooperation of electrochemistry, designing and modeling groups to try to combine new materials and designs in order to get the required performances.



FUEL CELL BASED APPLICATIONS

The Group is equipped with advanced fuel cell test stations, allowing fuel cell testing and experimentation on a wide range of fuel cells, from single cell assemblies to 20 kW systems. Dynamic load testing can be carried out on PEM, and DMFC systems, with full data logging. The Center offers LABVIEW capability for fuel cell testing and control and CHEMCAD capability for the design and simulation of complete fuel cell systems.



FACILITIES

Built on about 1000 m² surface, NCHFC is the largest Hydrogen research facility in Central and Eastern Europe. It includes 7 laboratories and a large testing and demonstration hall.

SCIENTIFIC COOPERATION

NHFC is ready to co-operate with regular citizens, the business community, authorities and research institutions to promote the development and the use of hydrogen technology, hydrogen production, fuel cells and renewable energy. At the same time NHFC is open to co-operate with partners locally, regionally, nationally and European and supply knowledge for the general public as well as a wide range of private companies. Large demonstrative and learning activities are foreseen by open partnerships with universities.

TECHNOLOGICAL SOLUTIONS

Large technological solutions were already developed or are going to be developed, related to hydrogen production, hydrogen cryogenic storage or hydrogen based integrated system for transportation or stationary applications.

BUSINESS SOLUTIONS

As a result of a successful experience, the scientific staff is looking forward for private companies partnerships to develop practical business solutions.



WE'VE ACHIEVED VARIOUS ACCOMPLISHMENTS. HOW CAN WE HELP YOU?



www.icsi.ro



Working in H₂ - mobility



Two versions of mobile hybrid electric-hydrogen platform has been designed and build and used for experiments within various projects. Both cars are fully functional and are runnign on public roads.

Romania's participation in FCH JU calls

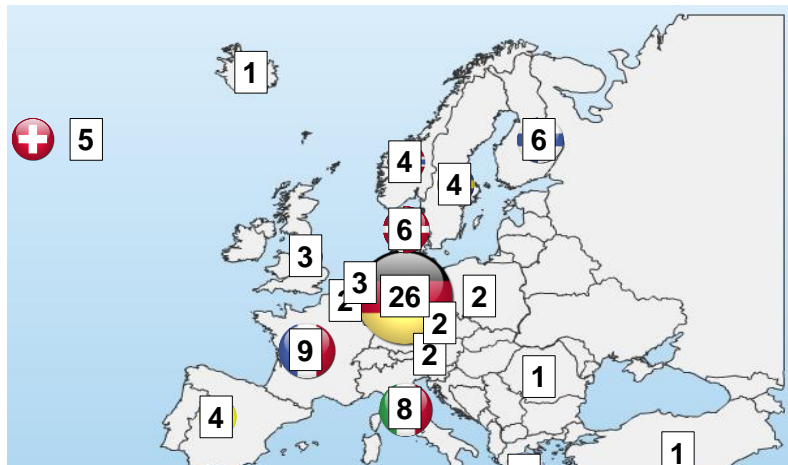
Nr.	Acronim	Titlul proiectului	Durata/an	Participanți
1.	MCFC-CONTEX	MCFC catalyst and stack component degradation and lifetime: Fuel Gas CONTaminant effects and EXtraction strategies	36 M/ 2008	OSKAR VON MILLER – SC OVM ICCPET SA
2.	HyUnder	Assessment of the potential, the actors and relevant business cases for large scale and seasonal storage of renewable electricity by hydrogen underground storage in Europe	24 M/ 2011	ICIT Rm. Valcea
3.	BioRobur	Biogas robust processing with combined catalytic reformer and trap	36 M/ 2012	Pirelli & C. Eco Technology Ro S.R.L.*



Pirelli & C. Ambiente S.p.A

Hydrogen and fuel cell R&D in East Europe,

- participants in FCH JU selected proposals-



2008

AT BE BG
EL ES FI



2009

EL ES FI FR HR IE IT LT LU LV MT NL
IS TR NO RU CH CA RS BY CN IL JP KR



2010

AT BE BG CY CZ DE DK EE EL ES FI FR HR IE IT LT LU LV MT NL
PL PT RO SE SI SK UK US IS TR NO RU CH CA RS BY CN IL JP KR

Hydrogen and fuel cell R&D in East Europe,

- participants in FCH JU selected proposals-

Country	Proposals	Financed projects (call, no.)	
BG Bulgaria	13	1	FCH-JU-2013: 1
CY Cyprus	2	-	
CZ Czech Republic	19	7	FCH-JU-2008: 2 FCH-JU-2011: 2 FCH-JU-2012: 3
EE Estonia	12	1	FCH-JU-2013: 1
HR Croatia	5	2	FCH-JU-2009: 1 FCH-JU-2012: 1
HU Hungary	3	2	FCH-JU-2011: 2
LT Lithuania	1	1	FCH-JU-2012: 1
PL Poland	43	17	FCH-JU 2008-2012
RO Romania	14	3	FCH-JU-2008: 1 FCH-JU-2011: 1 FCH-JU-2012: 1
SI Slovenia	32	9	FCH-JU-2009: 1 FCH-JU-2010: 1 FCH-JU-2011: 4 FCH-JU-2013: 3
SK Slovakia	2	-	
Total	146	<u>26</u>	

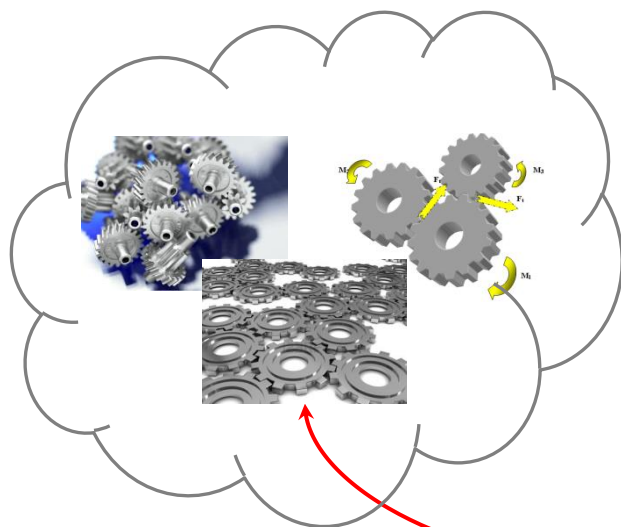


**FCH JU:
148 projects**

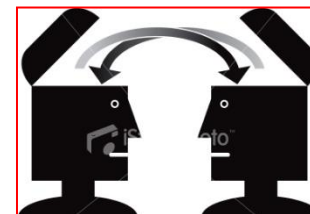


Europe has more speeds !!!

It's reality.

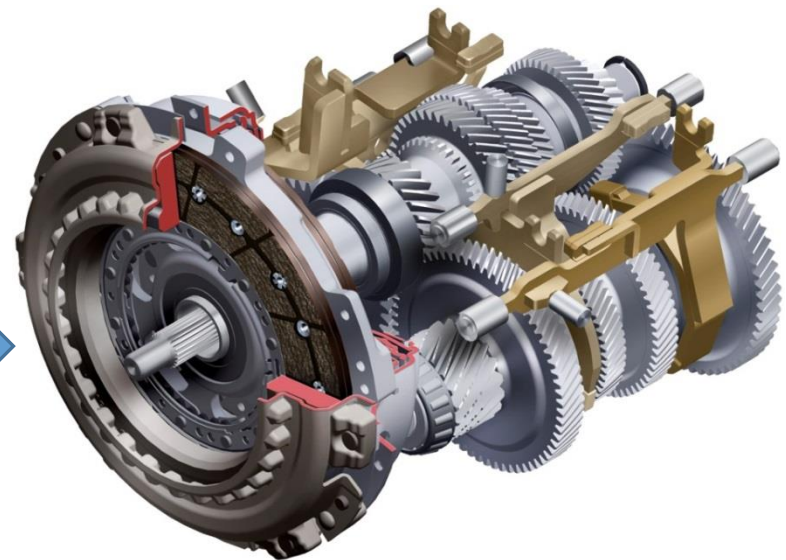
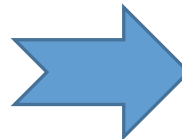
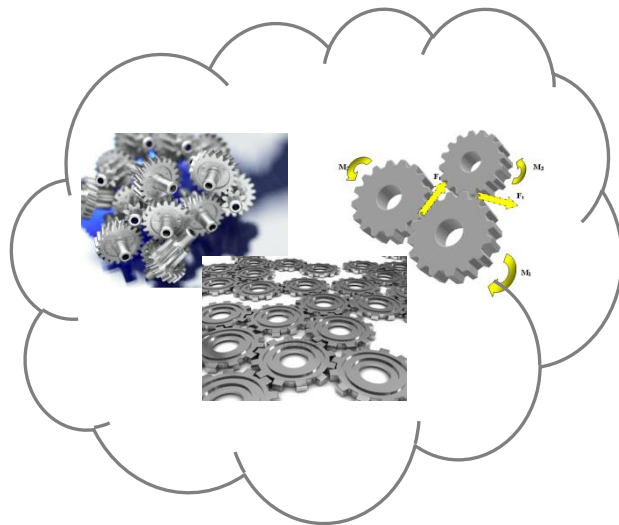


Let's us create an **adequate tool** !





Europe has more speeds !!!
It's reality.



Let's us create a gearbox!

In **"European equation"** we all will take a place.

Another example

Those pictures have in common what?



Those pictures have in common what?



Colors, they have in common colors!

- **We, East European Stakeholders,** are a necessary piece in “European equation” of hydrogen and fuel cell.
- Maybe we, **East European Stakeholders,** are not so important, but we are a color into complete picture of **European Hydrogen Map.**
- **Let us collaborate with openness, trust, and mutual respect!**

What we have in common?, (one example)

Co máme společného?

Cluj-Napoca

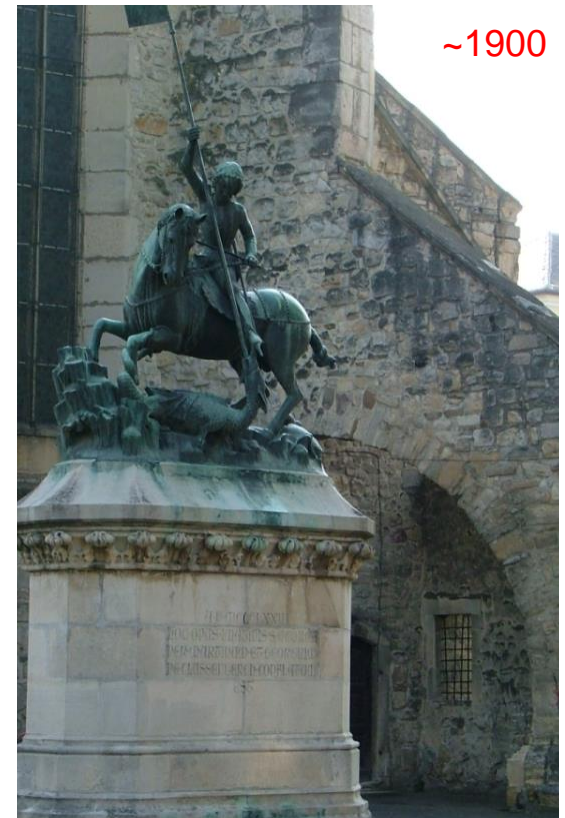
~1900

The statue of
St. George



A.D. MCCCCLXXIII HOC OPUS IMAGINIS S. GEORGII PER
MARTINUM ET GEORGIUM DE CLUSSENBERCH CONFLATUM EST

Bronzovou jezdeckou sochu sv. Jiří bojujícího s drakem na třetím
nádvoří Pražského hradu vyrobili v roce 1373 bratři Martin a Jiří z Kluže.



**Thank you for your attention
and visit us to**

National Center for Hydrogen & Fuel Cell !

