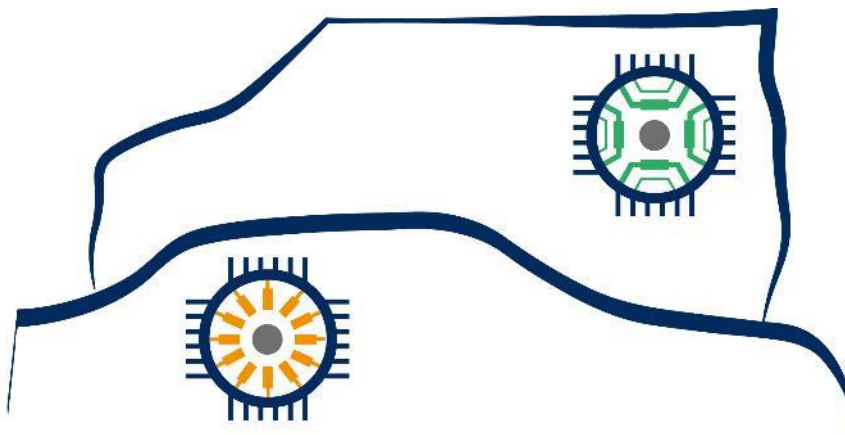


Rare Earth Free e-Drives Featuring Low Cost Manufacturing



ReFreeDrive

Collaborative Project

Grant Agreement Number 770143

Start date of the project: 1st October 2017, Duration: 36 months

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Table of Contents

ABBREVIATIONS	4
EXECUTIVE SUMMARY	5
1 INTRODUCTION	7
2 PLAN OF THE ACTIVITIES AND RESULTS	9
2.1 WEBSITE UPDATES	9
2.1.1 <i>Results</i>	9
2.1.2 <i>Next steps and actions</i>	11
2.2 CONFERENCES AND OTHER EVENTS.....	11
2.2.1 <i>Results</i>	11
2.2.2 <i>Next steps and actions</i>	11
2.3 SCIENTIFIC PAPERS	18
2.3.1 <i>Results</i>	18
2.3.2 <i>Next steps and actions</i>	19
2.4 REFreeDRIVE SPECIFIC EVENTS.....	21
2.4.1 <i>ECI European Motor Workshop 2019</i>	21
2.4.2 <i>GV04 Shared Workshop 2019</i>	21
2.4.3 <i>GV04 Workshop @ Coiltech World Magnetic Conference 2019</i>	22
2.4.4 <i>Results</i>	25
2.4.5 <i>Next steps and actions</i>	25
2.5 NEWSLETTER	25
2.5.1 <i>Results</i>	25
2.5.2 <i>Next steps and actions</i>	26
2.6 SOCIAL MEDIA.....	26
2.6.1 <i>Results</i>	26
2.7 BARRIERS AND RISKS	27
3 APPENDIX.....	29
3.1 WEBSITE.....	29
3.1.1 <i>News Section</i>	29
3.1.2 <i>Statistics of the website</i>	31
3.2 LEAFLET AND POSTER: FIRST RELEASE.....	33
3.3 NEWSLETTERS.....	34
3.3.1 <i>ECI 8th International Motor Workshop</i>	34
3.3.2 <i>GV04 Joint Workshop</i>	35
3.3.3 <i>Join us at Coiltech</i>	36
3.3.4 <i>ReFreeDrive @ World Magnetic Conference</i>	37
3.4 OTHER EVENTS	39
3.4.1 <i>Special Session @ IECON Conference</i>	39
3.4.2 <i>ECI 8th motor workshop</i>	40
3.5 SOCIAL MEDIA.....	42
3.5.1 <i>Common domain clustering all the active GV04 projects</i>	42
3.5.2 <i>Common linkedIn page clustering all GV04 active projects</i>	43
3.5.3 <i>ReFreeDrive Workshop @Coiltech - World Magnetic Conference</i>	44
3.5.4 <i>LinkedIn analytics after 12 month running of our cluster page:</i>	45

Abbreviations

ADAS = Advanced Driver Assistance Systems
CID = Fundación Cidaut
CSM = Centro Sviluppo Materiali
DEM = Direct Email Marketing
EGVIA = European Green Vehicle Initiative Association
EC = European Commission
ECI = European Copper Institute
EU = European Union
EV = Electric Vehicle
ICE = Internal Combustion Engine
IFPEN = Institut Français du Pétrol et des Énergies Nouvelles
IM = Induction Motor
MDL = Motor Design Limited
OEM = Original Equipment Manufacturer
PM = Permanent Magnet
PPM = Project Progress Meeting
PPT = Microsoft PowerPoint Format
PRI = Privè
RE = Rare Earth
RFD = ReFreeDrive
TBC = To Be Confirmed
TBD = To Be Defined
UAQ = University of l' Aquila, Italy

Executive Summary

The present report provides an overview on the planned and already realized activities, tools and elements to be used in the dissemination of ReFreeDrive project results to the envisioned audience.

The main goals of these activities are to:

- Create awareness about the potential of the proposed solutions
- Make results available for other potential beneficiaries or users
- Foster competitiveness and growth and increasing benefits to the European Union (EU) economy and citizens
- Create additional value for partners of the project
- Network with other H2020 projects
- Increase competitiveness of concerned industry in EU and sell project results
- Inform EU policy maker

This report contains the results related to the second reporting period of the project and the outlook for the third and last period. Hence the present report is highlighting those activities undertaken during the second year. This deliverable fulfils its objectives and there has been no deviation from the Grant Agreement foreseen regarding its content or timing.

The activities during the second year of the project have been mainly focused on:

- Continue to update the website (download section and the news);
- Organization and participation at suitable conference and events;
- Organization and participation to the GV04 projects shared Workshop
- Organization and participation to the GV04 Workshop @ Coiltech2019
- Publication of additional four scientific papers in 2019
- Updates of LinkedIn page shared with the GV04 projects Drivemode and ModuLED.

The results of the campaign are satisfactory and are tracked through the website visits. More than 2000 users and 8000 sessions have been collected in the period October 2017 - July 2019.

Bibliometric data related to the seven scientific papers published shows a couple of citations and a total of 324 reads. The newsletters used to promote ReFreeDrive Events were sent to more than 140.000 targeted addresses and viewed by more than 20.000 readers. The emails engaged a relevant part of the visits on the website (more than 600).

The LinkedIn page reports highlights over 650 visits, 171 followers and 46 shares of our posts.

Relating the second year of the project the barriers and risks recognized do not seem to have materialized or affected the dissemination. No correction plan needed. No new risks or barriers identified.

1 Introduction

The general plan for dissemination over the three years of the project was outlined as follows:

First period (up to March 2019): the main dissemination activities are focused on the scientific dissemination of the preliminary results and on creating awareness on stakeholders about the objective of the project and expected results.

Second period (up to December 2019): the prototyping stage is ongoing and dissemination of the results can continue with the technical and scientific contents, first results about final designs and preliminary prototypes can be discussed with potential industrial customers. Joint actions with other GV04 projects can be planned.

Third Period (up to the end of the project): the prototypes are ready and the dissemination campaign can be focused on stakeholders meetings to divulgate the results and to engage with potential partners for exploiting our results.

Although there is a small delay in the Prototypes manufacturing, we can stick to the dissemination plan thanks to the availability of spare key parts, semi-finished key parts and 3D printed demonstration models.

The core of the dissemination plan, meaning the description of the dissemination goals, the recognized target audience, the selected channels and the management of the dissemination is already outlined in D9.4. The following chapters report the activities planned and the results obtained in the second year of the project (M12-M24).

Each sub-chapter reports the impact of the individual avenue for dissemination actions, the chapters are organized in three parts:

- Actions accomplished
- Results
- Modification of the plan and future actions

University of L'Aquila (UAQ) works as dissemination leader (in cooperation with European Copper Institute (ECI) as communication leader), ensuring that all the partners within the Consortium disseminate the knowledge gathered in the project to the scientific and industrial and civil community. The main dissemination goal in the ReFreeDrive project is to communicate the results achieved in the project to identified stakeholder groups through the defined channels.

The detailed plan of the activities and the monitoring of the results are developed yearly and reported in the D9.4, D9.5 and D9.6 respectively for each year of the project.

Different actions have been planned to improve the dissemination campaign in the third period and are described in the specific sessions.

Status of the communication and dissemination activities is resumed in the following list;

- Project Logo;
- Website developed;
- Dissemination kit;
- Joint social media strategy with other GV04 Partners;
- Communication Plan defined and started;
- Dissemination Plan defined and started;
- 24 news published on the website
- 4+5 papers presented/accepted at conferences
- 16+ Events attended
- 20+ Posts on LinkedIn
- 2+ Stakeholders meetings
- 4+ newsletters
- 1 Common GV04 workshop
- Dissemination Plan D9.4, First Release (30-Sep-2018)
- ReFreeDrive Drivemode @ Coiltech2019 (25-26 September, to be reported in D9.6)
- Dissemination Plan D9.5 (30-Sep-2019)
- Other Comm. and Diss. Actions (ongoing)

2 Plan of the activities and results

The following chapters report the details of the communication and dissemination activities carried out in the second year of the project, along with the results and the planned actions for the next last year.

2.1 Website Updates

The website is online and its structure is complete, the news section has been continuously updated with about three news per month starting from April 2018. News to be posted are suggested by the partners and approved by Fundación Cidaut (CID) in the monthly Project Progress Meetings (see appendix).

Published scientific papers reporting project results are uploaded in the download sections and related news are released.

Project deliverables (if public) and deliverables executive summary (for confidential deliverables) are also accessible in the download section.

2.1.1 Results

The number of visits of the website shows an interest and their relevance to our target audience. The monitoring started at M06 and reported several visits matching with specific communication and dissemination actions. Actions with main impact on website visits are listed here (in order of importance):

- Participation at ReFreeDrive Events (Coiltech workshop, GV04 Workshop);
- Scientific Papers or presentations uploaded on the website
- Direct Email Marketing (DEM) released by Coiltech about the ReFreeDrive Workshop and related promotion on LinkedIn by the Coiltech organizers (see appendix 3.3.4)
- Leonardo Energy Newsletter (ECI)
- Cidaut Newsletter
- Events

Table 1 reports the results related to the website visits by Google Analytics associated with the main dissemination actions carried out, starting from M06. Data related to the September 2019 will be reported in the next report.

Figure 1 resumes in a graphic the data from Table 1. It can be noticed a drop of attention in the last period due to lack of news on the website. The usual update rate of the website was reduced after the GV04 workshop in Brussels. Nevertheless we have now recent results and published papers to update the website contents and renew the interest in the project.

The website has more than 100 monthly users that perform about 150-200 sections. The global data reports up to 2.000 users and 8.000 sessions. Interesting to notice that most of the visitors are from USA as reported in the detailed statistics in appendix. 3.1.

Table 1: ReFreeDrive Website analytics April18 –July18.

Reference Month	Users	New Users	Sessions	Page views	Main comm./diss. events carried out
FIRST YEAR OF THE PROJECT					
Apr-2018	82	70	93	264	
May-2018	125	117	176	527	Coiltech promotion of the World Magnetic Conference including ReFreeDrive
Jun-2018	102	95	153	481	ECI Newsletter, participation to WMM, CWIEME, ITEC, Others
Jul-2018	241	225	282	774	MDL paper uploaded in the down load section and related promotion
Aug-2018	145	113	189	498	Starting LinkedIn activities
Sep-2018	121	104	173	435	News about Coiltech and upload of D2.2; many LinkedIn posts
SECOND YEAR OF THE PROJECT					
Oct-2018	138	122	190	500	Motor Summit, ECI white Papers, many LinkedIn posts
Nov-2018	136	118	180	498	D3.1, H2020RTR, Coiltech PPTs No LinkedIn updates
Dec-2018	131	113	176	436	WMM paper, LinkedIn Coiltech PPT and Coiltech video
Jan-2019	128	111	177	493	World resource forum, LinkedIn: Coiltech PPTs
Feb-2019	155	140	177	566	Promotion of GV04 dissemination event
Mar-2019	154	139	192	553	GV04 dissemination event
Apr-2019	119	112	173	501	None
May-2019	146	132	203	521	ReFreeDrive @ IEMDC
Jun-2019	142	126	180	442	ReFreeDrive@ TAE Colloquium
Jul-2019	141	127	164	332	ReFreeDrive @ ECCE
Aug-2019	85	76	106	289	None

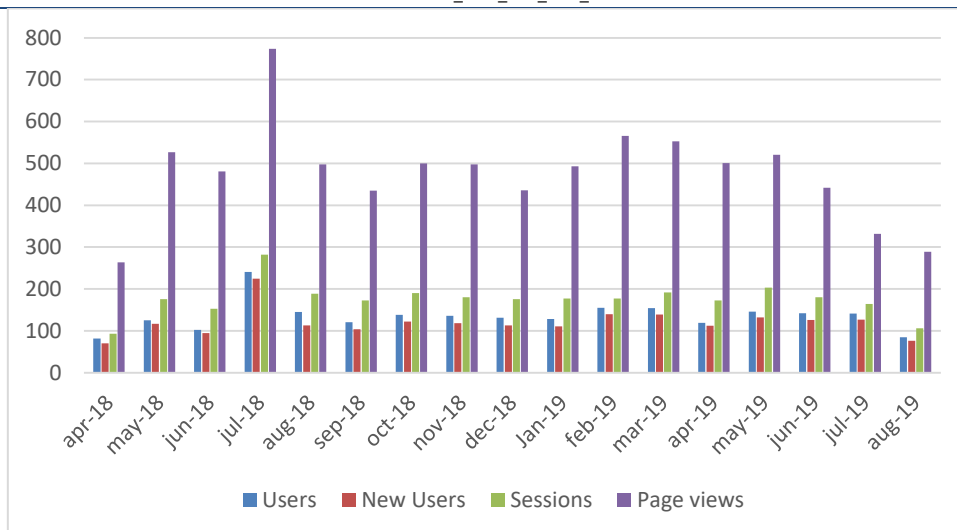


Figure 1: Website history data.

2.1.2 Next steps and actions

Considering the results, the following actions are confirmed for the future, with the internal recommendation to have more regular updates with relevant and interesting content and pictures, specifically when the prototyping step concludes.

- Three news per month on the website are maintained
- All the papers will be available on the website for download
- LinkedIn page will be used to enhance the website visibility

2.2 Conferences and other events

Following the list of the identified events presented in Table 1 – D9.3, and other events proposed during project meetings, the dissemination plan outlined for 2019 is reported in Table 2. The same table reports also which partners attended the events and some comments.

2.2.1 Results

In the second year of the project **12 national and international events** have been attended. In these events, the project has been introduced to the scientific community, industry representatives, Original Equipment Manufacturer (OEM), suppliers, other stakeholders and policymakers. Including data from first year the total amount of events attended is 22.

2.2.2 Next steps and actions

Considering the results and the feedbacks obtained, the participation to conferences and events will continue in the Third year of the project. The participation to events and conferences through papers and presentations is an effective way to disseminate the project results.

For the third year of the project the preliminary list of planned events is reported in Table 3, as many events are still to be defined, updates will be released during the Project's Progress meetings (PPMs). At the moment when submitting this present report, we are still waiting for final confirmation from the organizer that some partners will represent ReFreeDrive (RFD) together with the other two GV04 projects at Transport Research Arena 2020, in the common booth hosted by the European Commission (EC), but are confident to show our results and some physical prototypes in this occasion.

Table 2: Conferences and other events attended in second year.

Name	Location	Date(s)	Focus	Partner(s) Involved	Comments
EIT Raw Materials	Darmstadt, DE	23 rd - 24 th Oct 2018	Magnets & E-Drives: We will look into the Rare Earth value chain and electric drives. There will be keynotes on Rare Earth Sourcing, High Performance Permanent Magnets, as well as E-drives and Magnetic Cooling. This will be followed by dedicated breakout sessions.	ECI	Project presentation and discussion: - Project is interesting, companies are looking to less critical materials, recycling and new processes
Motor Summit International	Zurich, CH	14 th - 15 th Nov 2018	The Motor Summit 2018 International brought selected international experts together from research, public authorities, utilities, manufacturers of motors, pumps and fans, OEM, motor systems users and other interested parties.	UAQ, ECI	ReFreeDrive Project presented, general interest in the aim of the project
ERTRAC H2020 RTR18	Brussels, BE	28 th - 29 th Nov 2018	European Green Vehicle Initiative Association (EGVIA) event on various key topics for the future of road transportation in Europe	ECI	RFD is one of the few initiatives on electric vehicles, lot of effort in improving Internal Combustion Engine (ICE) and Advanced Driver Assistance Systems (ADAS) technologies
World Resource Forum	Antwerp, BE	24 th - 27 th Feb 2019	Sustainable material management and circular economy	ECI, CID	Project Presentation, general interest on the project
8th Int. ECI Motor Workshop	Brussels, BE	19 th Mar 2019	The workshop will present a series of technology innovations in the field of electric motors for	All	Project Presentation, Discussion about technologies and open points for

			industrial applications and will provide an update of the regulatory framework.		Electric Vehicle (EV) mass production
GV04 EU Projects Workshop	Brussels, BE	19 th Mar 2019	Common GV04 EU Project workshop, introduction By EU Project Officer and conclusion by EGVA representative	All	Drivemode, Moduled and ReFreeDrive Projects presented their objectives and results. General interest in the Audience
Int. Electrical Machines and Drives Conference	San Diego, CA, USA	12 th - 15 th May 2019	IEMDC is one of the most relevant meeting point for electrical machines and drives research experts.	MDL, UAQ	Two papers presented about Pure SynRM and Induction Motors (IM) motors, very high attention from the audience.
CWIEME Berlin 2019	Berlin, DE	21 st - 23 rd May 2019	Exhibition and conference on manufacturing technology for electrical machines	UAQ, MDL	Stakeholders meetings with suppliers and manufacturers
EVS32	Lyon, FR	22th May 2019	EVS is the leading international event to address all these issues. The various components of electric mobility will be on display; from markets to vehicle battery technology (hybrid and hydrogen fuel cell); from motorcycles to trucks, and from charging facilities to related services and public policy	ECI, IFPEN	Paper on Permanent Magnet (PM) Assisted SynRM presented, Project Presentation, stakeholders meetings
Global Rare Earth Industry Association	Brussels, BE	25 th June 2019	Best practices for Sustainable Rare Earth Supply	ECI	Leaflet distribution, offline introductions to RFD as an alternative technology
TAE Colloquium	Ostfildern, (Stuttgart), DE	2 nd July, 2019	E-mobility, energy & climate, digitalization, new infrastructure solutions	ECI	ReFreeDrive paper, Presentation, Stakeholders meeting
9th Conf.	Poznan,	1 st	Life cycle management,	ECI	ReFreeDrive

on Lyfe Cycle Manageme nt	Poland	Sept. 2019	environmental, economic and social sustainability. special session on sustainable mobility	Presentation, abstract.
----------------------------------------------	--------	---------------	-----------------------------------------------------------------------------------------------------	----------------------------

Table 3: Preliminary plan for conferences and events in the third year.

Name	Website	Location	Date(s)	Focus	Partner(s) Involved (TBC)	Notes
ECCE2019	www.ieee-ecce.org/2019/	Baltimore, USA	29 th Sep. 03 rd Oct. 2019	ECCE is the pivotal int. conference and exposition event on electrical and electromechanical energy conversion field	UAQ, MDL	
Conference on Sustainable Mobility	https://www.automotive-ig.com/events-e-motor-conference	Catania, IT	14 th 15 th October 2019	The aim is promoting an intensive interaction of stakeholders in the field of green mobility, bringing together academics, researchers and industry representatives	PRI	
IECON 2019	www.iecon2019.org	Lisbon, PT	14 th -17 th Oct 2019	Annual Conference of the IEEE Industrial Electronics Society (IES), focusing on contemporary industry topics ranging from electronics, controls, manufacturing, to communications and computational intelligence.	UAQ, MDL	Organized Special session on Electrical machines with reduced rare earth materials
EU-US-JP Trilateral Conference	N/A	Brussels, BE	29 th Nov	Strategies for Sustainable Supply of Critical Raw Materials	ECI	ReFreeDrive invited
EGVI RTR 19	https://egvi.eu/event/h2020rtr-european-conference-3d-	Brussels, BE	4 th , 5 th Dec	Showcase the results of selected H2020 funded projects on road	ECI	

	<u>edition/</u>		2019	transport related areas		
Transport Research Arena 2020	www.traconference.eu	Helsinki, FI	27 th -30 th April 2020	European Research and Technology Conference on Transport and Mobility	CID, UAQ, MDL,	GV04 participation in the EU booth
Coiltech Deutschland 2020	www.quickfairs.net	Ulm, DE	1 st -2 nd April 2020	International trade on manufacturing equipment for electrical machines and conference	UAQ, TBD	
WMM 2020	TBD	Rome, IT	June 2020	International conference on Magnetism and Metallurgy	UAQ, CSM	
Speedam 202	www.speedam.org	Sorrento, IT	24 th -26 th June 2020	International Symposium on Power Electronics, Electrical Drives, Automation and Motion	UAQ, Other	
ICEM 2020	https://icem2020.se/	Gothenburg, SE	23 th 26 th August 2020	International conference on Electrical Machines	UAQ, TBD	
ICREPQ'20	http://www.icrepq.com/	Granada, SP	1 st -3 rd April 2020	International Conference on Renewable Energies and Power Quality	ECI	

2.3 Scientific papers

Among the preliminary list of conferences suitable for publication (Table 2 – D9.3) and additional events identified during the project progress meetings, during the first and the second year of the project **7 papers** were published in peer reviewed conference proceedings. Details are reported in the following.

2.3.1 Results

The work of the partners has contributed to publish finally following papers:

Three scientific papers have been published in the first year of project. The papers report preliminary analyses and results carried out in the early stage of the project. The papers are:

1. M. Villani, "High Performance Electrical Motors for Automotive Applications – Status and Future of Motors with Low Cost Permanent Magnets" International conference on Magnetism and Metallurgy, June 2018.
2. M. Tursini, M. Villani, G. Fabri, A. Credo, F. Parasiliti, A. Abdenour, "Synchronous Reluctance Motor: Design Optimization and Validation" *International Symposium on Power Electronics Electrical Drives, Automation and Motion (Speedam)*, June 2018.
3. M. Villani, M. Tursini, M. Popescu, G. Fabri, A. Credo, L. Di Leonardo "Experimental Comparison between Induction and Synchronous Reluctance Motor-Drives" *International Conference on Electrical Machines*, September 2018.

Four scientific papers have been published in the second year of project. The papers report preliminary analyses and results carried out in the middle stage of the project. The papers are:

4. A. Credo, G. Fabri, M. Villani and M. Popescu, "High Speed Synchronous Reluctance Motors for Electric Vehicles: a Focus on Rotor Mechanical Design", 2019 IEEE International Electric Machines & Drives Conference (IEMDC), 2019.
5. N. Riviere, G. Volpe, M. Villani, G. Fabri, L. Di Leonardo and M. Popescu, "Design Analysis of a High Speed Copper Rotor Induction Motor for a Traction Application", 2019 IEEE International Electric Machines & Drives Conference (IEMDC), 2019.
6. T. Jezdinsky, F. Nuño, "Innovative E-Drive solutions for battery electric vehicles avoiding rare earths" TAE Colloquium, July 2th 2019, Ostfildern (DE), available on Conference proceedings ISBN Nr: 978-3-943563-08-5 TAE Technische Akademie Esslingen, Future Mobility – automatisiert – vernetzt – elektrisch, July 2019.
7. A. Abdelli, B. Chareyron, B. Gaussens, "Design of A 200 Kw Pm Synrm Motor Without Rare-Earth For Electric Vehicle", 32nd International Electric Vehicle Symposium (EVS32), 20th-22nd May 2019, Lyon (FR).

The partners contributing to these publications are ECI, IFPEN, MDL, and UAQ. All the papers are available through open access or green open access, papers 2, 3, 4, 5 are Green Open Access and will be uploaded in the Zenodo repository for as public domain.

To monitor the impact of these papers on the scientific community, bibliometric data are collected when available. Data about citations and reads are reported in Table 4.

Table 4: Bibliometric data related to ReFreeDrive Papers (when available).

Paper	Source	IEEE	Scholar	Research Gate	Scopus
First year					
1	Read:	N/A	N/A	N/A	N/A
	Citations:	N/A	N/A	N/A	N/A
2	Read:	127	N/A	34	N/A
	Citations:	1	1	1	1
3	Read:	132	N/A	22	N/A
	Citations	1	1	1	1
Second Year					
4	Read:	47	N/A	45	N/A
	Citations	0	0	0	0
5	Read:	18	N/A	14	N/A
	Citations	0	0	0	0
6	Read:	N/A	N/A	N/A	N/A
	Citations:	N/A	N/A	N/A	N/A
7	Read:	N/A	N/A	N/A	N/A
	Citations:	N/A	N/A	N/A	N/A

2.3.2 Next steps and actions

The aforementioned papers will be uploaded in the website to leverage the dissemination. The partners will keep working in the publication on papers in technical conferences and will work on publications for journals too.

A Special Session on *Electrical machined for e-mobility with reduced rare earth materials* has been proposed at IECON conference by MDL and UAQ to further increase the dissemination in the

scientific community and to collect relevant contribution from inside and outside the project. UAQ and MDL also proposed a paper about RFD studies.

The Special Session has been approved and will be held during IECON Conference (14th-17th October, Lisbon, Portugal). Figure 2 reports the details of the Agenda.

Other papers have been accepted for ECCE conference and will be reported in D9.6.

Other opportunities and avenues for publication will be evaluated during PPM.

14:15 - 15:55 SS Electrical machines for emobility with reduced rareearth materials	14:15-14:31 LD-027332 Reluctance Synchronous Electric Motor without magnets solution for e-mobility: a possible workflow for a quick and accurate design and optimization Emanuel Castagnaro, Luigi Rizzi, Giuseppe Zanocchi, Alberto Rubino
	14:31-14:47 LD-035769 Enhancing the Torque Density of Conventional PM-SynRel Machine with Hybrid Flux Barrier Ram Kumar R M, Gaurang Vakil, David Gerada, Adam Walker, Chris Gerada, Krzysztof Pacitura, Alastair McQueen, B G Fernandes, Salvatore La Rocca, Mahir Al-Ani
	14:47-15:03 LD-036676 Multi-physics Design Optimisation of PM-assisted Synchronous Reluctance Motor for Traction Application Mahir Al-ani
	15:03-15:19 LD-040851 Performance Evaluation of an Induction Motor Drive for Traction Application Lino Di Leonardo, Mircea Popescu, Giuseppe Fabri, Marco Tursini
	15:19-15:35 LD-022047 Thermal Analysis of Totally Enclosed Fan Cooled Synchronous Reluctance Motor-state of art Payam Shams Ghahfarokhi, Anouar Belahcen, Ants Kallaste, Toomas Vimann

Figure 2: Agenda of IECON Special Session on Electrical machined for e-mobility with reduced rare earth materials.

2.4 ReFreeDrive Specific Events

2.4.1 ECI European Motor Workshop 2019

The workshop has presented a series of technology innovations in the field of electric motors and an update on the legal framework. This workshop was a platform for different stakeholders to present know-how and technology, as well as specific studies or projects.

The meeting was held in Brussels, 19th March 2019, organized by European Copper Institute and attended by more than 60 stakeholders in the field of electric motors to discuss about the future of electric motors in Europe, in industrial application but also in the automotive fields. The same audience was then invited to join the subsequent GV04 workshop in the afternoon in the same venue to continue the discussion focused on innovative electrical drivetrains. The agenda and participation list is reported in appendix.

2.4.2 GV04 Shared Workshop 2019

The GV04 workshop has been organized by ECI as a joint event of the ECI European motor workshop on the 19th March 2019 in Brussels. The entire afternoon was dedicated to present the three projects Drivemode, ModuLED and ReFreeDrive by the respective partners, to discuss objectives and results with the audience. The Project Officer of the three projects opened the workshop with an intro speech and a representative from EGVI association concluded with a final summary.

The agenda of the joint GV04 workshop is reported in Figure 3, Figure 4 reports pictures about highlights of the session.

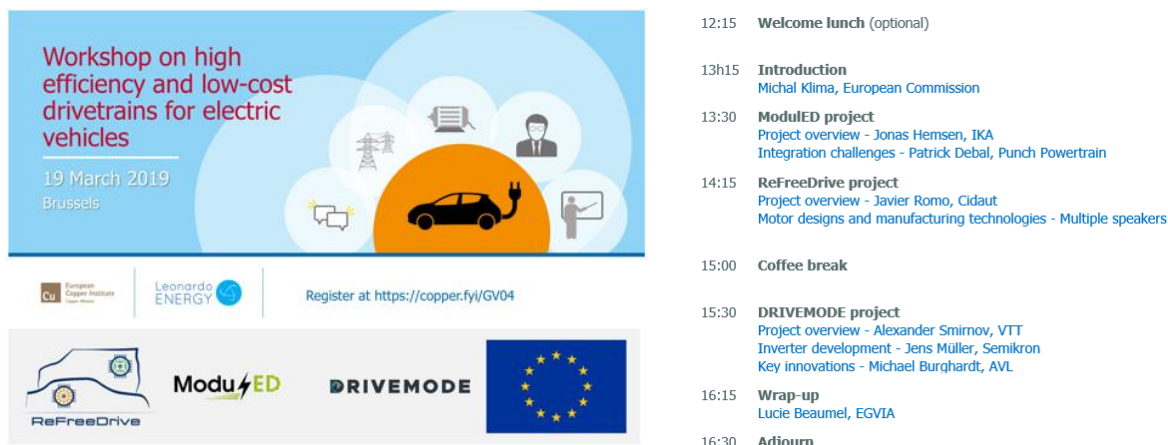


Figure 3: Agenda of the joint GV04 workshop.



Figure 4: Pictures from the joint GV04 workshop: Introduction (left), audience (centre), Wrap up (right).

2.4.3 GV04 Workshop @ Coiltech World Magnetic Conference 2019

After the success of the 2018 edition (See Pictures in Figure 5), a dedicated workshop on **“ADVANCED POWERTRAINS FOR ELECTRIC VEHICLES”** has been also organized in the 2019 edition inside the International technical conference “World Magnetic Conference”, involving other EU projects in the field of e-mobility.

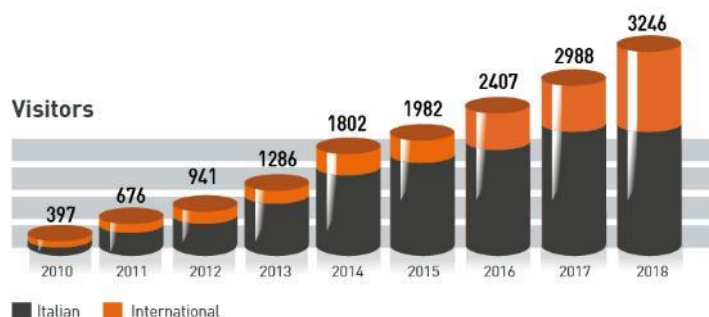
UAQ cooperates in the organization of the “World Magnetic Conference”, International Conference in the field of the coil winding industry, voluntary based and free of charge. Figure 6 reports the numbers of the visitors of the 2018 edition and the categorization of the attendees.

The GV04 Workshop will take place on Wednesday 25th of September and the agenda is reported in Table 5 (www.visitcoiltech.com).

During the conference the first edition of the the DecarbEurope booklet on the electric motor solutions (developed by ECI) was distributed to the audience, ReFreeDrive project is mentioned in the booklet as reported Figure 7.



Figure 5: Pictures of the ReFreeDrive workshop @ Coiltech 2018: audience (left), RFD partners (right).



Head of Production	10%
Production staff	10%
Product and quality management	4%
Head of R&D	7%
R&D staff	8%
Other Engineering	2%
Research and University	7%
Owner/Co-owner	18%
President/CEO/Vice President	6%
Other top management	3%
Head of Purchasing and sourcing	12%
Purchasing and sourcing staff	6%
Other staff	7%

Figure 6: Amount and type of Coiltech visitors.

Table 5: Programme of the ReFreeDrive Workshop @ Coiltech.

ADVANCED POWERTRAINS FOR ELECTRIC VEHICLES P1 Workshop on the latest EU Researches in traction technology for electric vehicles		
10:45	Fundación Cidaut	J. Romo
	ReFreeDrive project presentation and status	
11:00	Jaguar Land Rover	C. Thackwell
	Rare-earth free drive units for powertrain electrification	
11:25	IFP Energies Nouvelles, Motor Design Limited, University of L'Aquila	A. Nasr, N. Riviere, M. Villani
	ReFreeDrive project: rare-earth free e-motor solutions	
12:00	Aurubis, Breuckmann, European Copper Institute	P. Walmsley, D. Schmitz, F. Nuño
	ReFreeDrive Project, copper rotor manufacturing technologies: die-cast and fabricated profiles	
12:40	Politecnico Torino	M. Martino, G. Pellegrino
	FitGEN: Functionally Integrated E-axle Ready for Mass Market Third Generation Electric Vehicles	
14:30	Vtt	M. FarzamFar, A. Smirnov
	Drivemode project presentation and status	
14:55	Avl, University of Ljubljana	M. Burghardt, D. Miljavec
	High-speed electrical motor development	

15:20	Semikron	<i>J. Mueller, R. Bittner</i>
	<i>SiC inverter for automotive application</i>	
15:45	Breuckmann	<i>P. Szilagyi</i>
	<i>Cutting edge rotor casting technology - high performance cast rotors with zero porosity</i>	

Developing powertrains for electric mobility free of critical raw materials

So far, permanent magnet technologies using rare earths have dominated the landscape of electric mobility due to their high power and torque density, as well as their high efficiency. The number of electric motors in this sector is expected to grow exponentially. However, rare earths have the highest risk of disruption in the EU supply among all critical raw materials (CRM), according to the European Commission list of CRMs.

Therefore, there is a concern on the viability of this technology for mass production.

Research and development of rare earth-free alternatives should be supported. The performance ratios achieved by their permanent magnet counterparts can be reached and even exceeded. Initiatives such as ReFreeDrive (H2020 EU funded project, www.refreedrive.eu) are pushing the boundary of the current induction and synchronous reluctance technologies, achieving unprecedented values of power and torque density, combined with the highest efficiency levels.

Further support for innovation and industrialisation of rare earth-free technologies would help the European industry to go through the critical raw materials bottleneck in electric mobility.

Figure 7: DecarbEurope booklet mentioning ReFreeDrive Project.

2.4.4 Results

The ECI European Motor Workshop 2019 and subsequent joint GVO4 workshop engaged with more than 120 stakeholders in the field of electric motor designer, manufacturers and policymakers. The ReFreeDrive Project and the importance of R&D activities in Rare Earth (RE) free electrical drives were central topics in the event and attracted the attention of a broad audience.

The ReFreeDrive workshop at Coiltech 2018 was a good networking event, many potential component suppliers and motor manufacturers joined the session. Videos and pictures were used with success in the following months to boost the dissemination on the social media and website.

2.4.5 Next steps and actions

The success of the ECI Workshop and the feedbacks from the GV04 Workshop encourage repeating the initiatives also in the 2020, compatibly with the other joint events. Additional events and stakeholders meetings will be evaluated during Project Progress Meetings.

2.5 Newsletter

Considering the lack of subscribers to the ReFreeDrive newsletter the plan was modified as follows:

- Partners that usually distribute their own newsletters are invited to release project news in their newsletters.
- ECI “Leonardo Energy” newsletter from ECI will be used for specific events related to ReFreeDrive
- Communications about the participation of ReFreeDrive in specific events will be included in the DEM of the event.

2.5.1 Results

The newsletter released by the partners (Cidaut, ECI) and by the Coiltech Events’ organizers (QuickFairs) showed notable success. Data about ECI newsletter is reported in Appendix 8.3 along with the newsletter examples.

Data from newsletter sent by Coiltech organizers to promote the ReFreeDrive Workshop in the 2018 edition were available in December 2018 and reported in Figure 8.

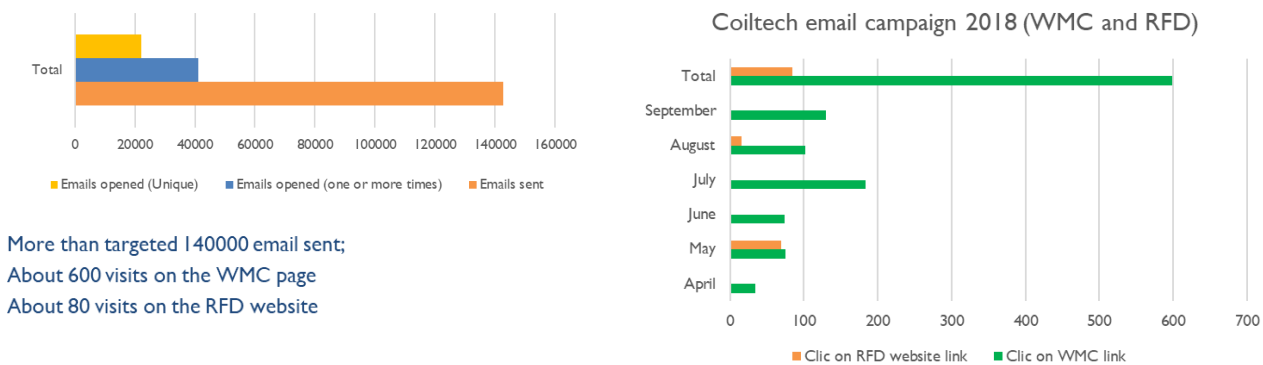


Figure 8: Results from the Coiltech email campaign.

2.5.2 Next steps and actions

The activities planned in the 2019 about newsletter are confirmed for the 2020. We'll continue to cooperate with events' organizers to promote the presence of ReFreeDrive dissemination activities in the event (and hence project results).

2.6 Social Media

The social media strategy is mainly based on a joint LinkedIn company page activated in August 2018 by ReFreeDrive, the "Electric Drivetrain-Innovation-Cluster" page.

The administration of the page is allocated to project coordinators or communication leaders rotating every three months, with ReFreeDrive partner ECI starting as leader.

In order to guarantee flow of content and posts at least once to three times per month as agreed upon, all project coordinators and communication and dissemination leaders of the three projects of the cluster are setting-up a list of possible topics to be posted and prioritize the sequence and timing of posting.

2.6.1 Results

After the first 12 months running, our common LinkedIn cluster page achieved 651 visits, 171 followers and 42 shares of posts.

The single post with the most impressions (over 1,380) was related to announce ReFreeDrive participation at Coiltech 2018/ World Magnetic Conference.

For the detailed LinkedIn analytics see appendix.

2.7 Barriers and Risks

Also in the second year of the project the potential barriers and risks stated in chapter 3.4 - D9.4 have not materialized or affected the dissemination. No correction plan needed. No new risks or barriers have been identified (Table 6).

Table 6: Dissemination barriers

Barriers	Severity	Countermeasures	Impact on the project (up to M22)
Protection of methods and results by the owners.	Medium	Each partner is responsible for the exploitation of its own results and will take care of the comprehensiveness of the results to be disseminated.	Minor impact, the countermeasures are valid
Lack of target audience	Low	Selected target audience is wide and comprehensive, feedbacks from the communication and dissemination campaign will be used to improve the target audience	Minor impact, the countermeasures are valid
Difficulties in reaching the main stakeholders in the field	High	Main stakeholders could be difficult to be reached and to be convinced, the inclusion of different kind of events in the field i.e. conferences, exhibitions and stakeholder meeting will help in reaching the main stakeholders. Liaison with the other GV04 projects will help in strengthen the messages	Minor impact, the countermeasures are valid, the wide selection of events and joint action with other GV04 project are effective
Target audience not convinced of the exploitation potential of the results	Medium	Particular attention will be paid in highlighting the potentiality of the results, Tests and demonstrations Steps will be extensively documented to support the dissemination activities	Minor impact, the countermeasures are valid

The Table 7 reports the recognized risks in the dissemination campaign and selected mitigation actions.

Table 7: Dissemination risks

Risks	Severity	Mitigations	Impact on the project (up to M22)
Delay in dissemination due to delay in Results.	Medium	The dissemination campaign started at the beginning of the project as soon as meaningful preliminary results are available. Preliminary study and adopted methodologies will be used in the early stage of the dissemination.	None, dissemination started at the preliminary steps of the projects and progresses in line with results availability
Results not convincing	Medium	Comparison of different solution will be provided and validated. Links to a comprehensive reference list about the state of art and literature will be provided	None, comparison with state of art shows that the project results are promising.
Lack of comprehensive Results	Low	Each partner is responsible for the exploitation of its own results and will take care of the comprehensiveness of the results to be disseminated. A list of expected results and data to be collected will be discussed among all the partners	None, good coordination in dissemination activities and contents
Lack of Resources for Dissemination	Medium	To optimize the resources available will be taken advantage of the skills and the tools of each partners and the initiatives undertaken by them	Minor impact, large participation to events is lightly affecting budget, no issues highlighted by partners up to now
Disclose confidential Information	Low	Each partner is proprietary of the results carried out during the activity in the project and responsible of their dissemination	Not evidence at the moment about disclosure of confidential information

3 Appendix

3.1 Website

3.1.1 News Section

The pictures related to the news updated on the website during second year of the project are reported in Figure 9 and Figure 10.

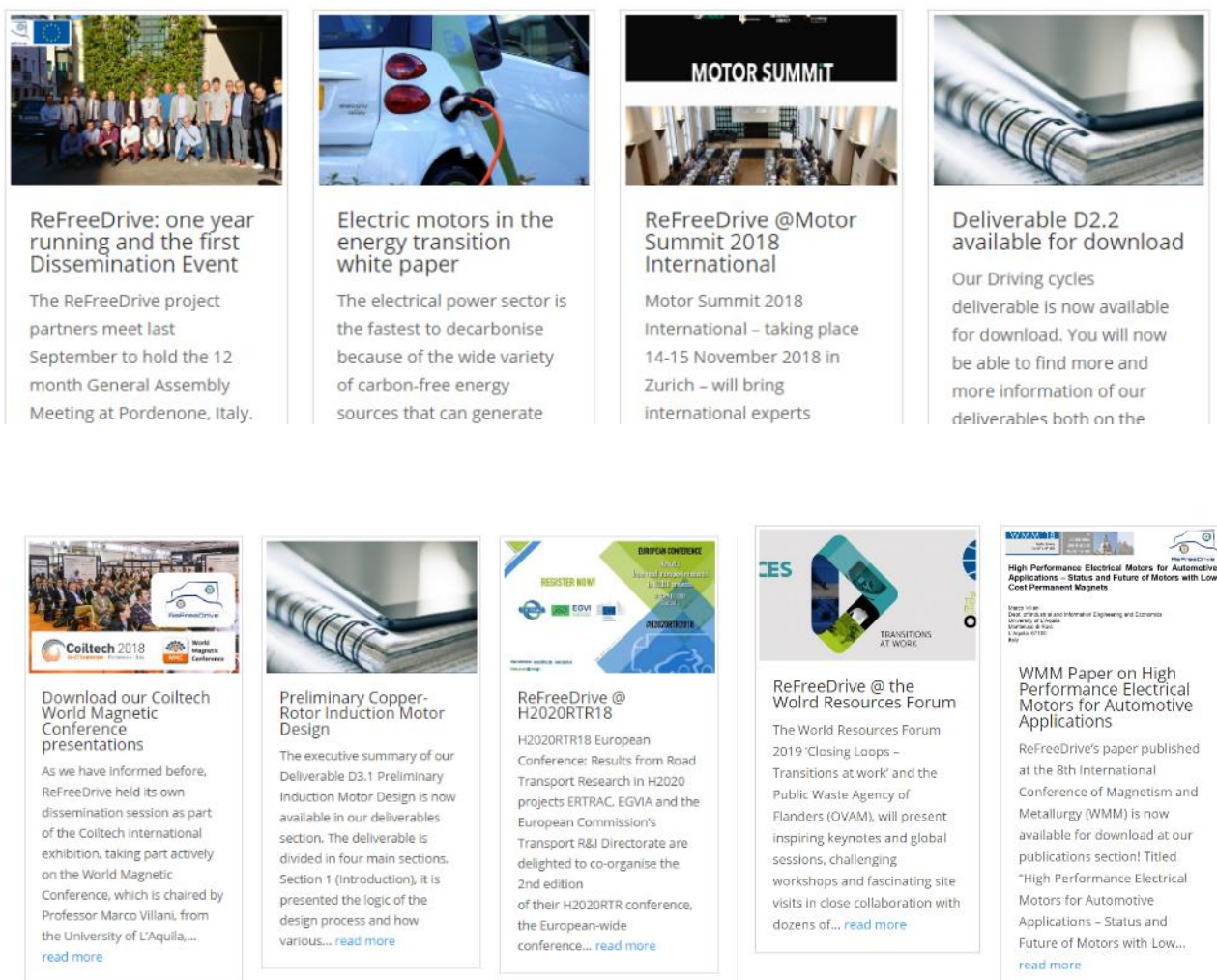


Figure 9: View of the news on the website part A.



ReFreeDrive @ EVS32


The 32nd edition of the Electric Vehicles Symposium will take place on 19-22 May 2019 in Lyon (France). Sustainable mobility is a core concern for all industrial players and public authorities. It affects both our lifestyles and our economy, as well as facing major... [read more](#)



Synchronous Reluctance Motor: Design, Optimization and Validation

ICEM and SPEEDAM Conference Papers on Electric Motor Technologies

ReFreeDrive project's activities and results have been published throughout 2018 on various international conferences. As a result, now you can find two conference papers about electric motors available for download at our publications section, both written by... [read more](#)



new deliverables available for download

The ReFreeDrive project activities are going ahead, so that in the last weeks new deliverables are available for download in our deliverables section: • Deliverable D2.3 "Functional subsystems full technical specifications". (Confidential). You can download the... [read more](#)



GV04 Dissemination Event Overview

Last 19th of March, the joint GV04 Dissemination Event took place in Brussels. The workshop presented the innovations that are currently being developed by three EU-funded projects under the European Green Vehicles Initiative (EGVI): ModuLED, ReFreeDrive and... [read more](#)



ReFreeDrive @Joint GV04 Dissemination Event

On Tuesday 19th of March, ReFreeDrive project will hold a new dissemination session in Brussels. The goal of the workshop is to present the solutions that are being developed by three EU-funded projects under the European Green Vehicles Initiative (EGVI): ModuLED, ReFreeDrive and... [read more](#)




ReFreeDrive @ ECCE 2019

From September 29 to October 3, 2019, the eleventh Annual IEEE Energy Conversion Congress & Exposition (ECCE 2019) will be held in Baltimore, Maryland (USA). IEEE ECCE shares an insight into the recent research and cutting-edge technologies in electrical and... [read more](#)




ReFreeDrive @ IEMDC 2019

The IEEE International Electric Machines and Drives Conference (IEMDC) has become one of the major events in the field of electrical machines and drives. IEMDC is a reference forum to disseminate and exchange state of art in the field of Electrical Machines and... [read more](#)



ReFreeDrive @ TAE Colloquium

On Tuesday 2nd of July, Tomas Jezdinsky from European Copper Institute (ECI), one of the ReFreeDrive project partners, will take part in the colloquium "Future Mobility" hosted by TAE (Technische Akademie Esslingen) in Ostfildern, Germany. The colloquium "Future... [read more](#)



ReFreeDrive Midterm review meeting

ReFreeDrive project reached half of its length last March. This means it was time to hold the Midterm review meeting. To this end, all project members and the Project Officer met last 22nd and 23rd of May in Brussels, at Aurubis facilities. During the meeting, the... [read more](#)



ReFreeDrive @ Coiltech 2019

ReFreeDrive's project partners had an excellent experience last year at Coiltech 2018 fair. For this reason, they will also be present at Coiltech 2019, International Coil Winding Exhibition and Conference, which will be held on 25-26th September 2019 at Pordenone... [read more](#)



ReFreeDrive @ EVS32


The 32nd edition of the Electric Vehicles Symposium will take place on 19-22 May 2019 in Lyon (France). Sustainable mobility is a core concern for all industrial players and public authorities. It affects both our lifestyles and our economy, as well as facing major... [read more](#)



Synchronous Reluctance Motor: Design, Optimization and Validation

ICEM and SPEEDAM Conference Papers on Electric Motor Technologies

ReFreeDrive project's activities and results have been published throughout 2018 on various international conferences. As a result, now you can find two conference papers about electric motors available for download at our publications section, both written by... [read more](#)



new deliverables available for download

The ReFreeDrive project activities are going ahead, so that in the last weeks new deliverables are available for download in our deliverables section: • Deliverable D2.3 "Functional subsystems full technical specifications". (Confidential). You can download the... [read more](#)



GV04 Dissemination Event Overview

Last 19th of March, the joint GV04 Dissemination Event took place in Brussels. The workshop presented the innovations that are currently being developed by three EU-funded projects under the European Green Vehicles Initiative (EGVI): ModuLED, ReFreeDrive and... [read more](#)

Figure 10: View of the news on the website part B.

3.1.2 Statistics of the website

An example of the monthly statistics can be extracted from the website is reported D9.4, appendix 8.1.2. Global statistics since the kick-off of the website are reported in the following Figure 11, Figure 12, Figure 13.

October 2017-July 2019 Audience Overview

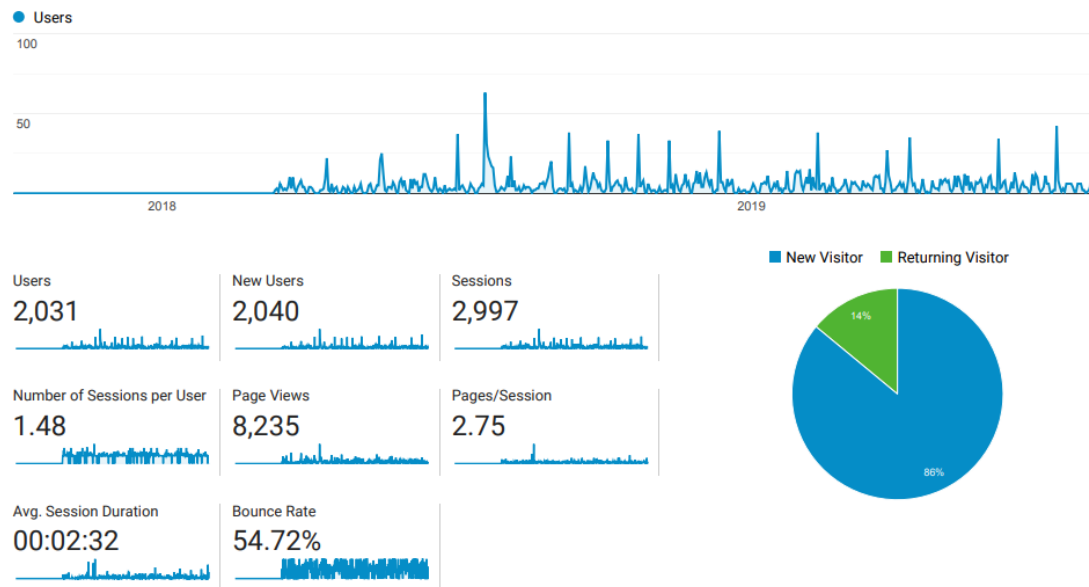


Figure 11: Website global audience overview.

October 17 – July 19: Page views

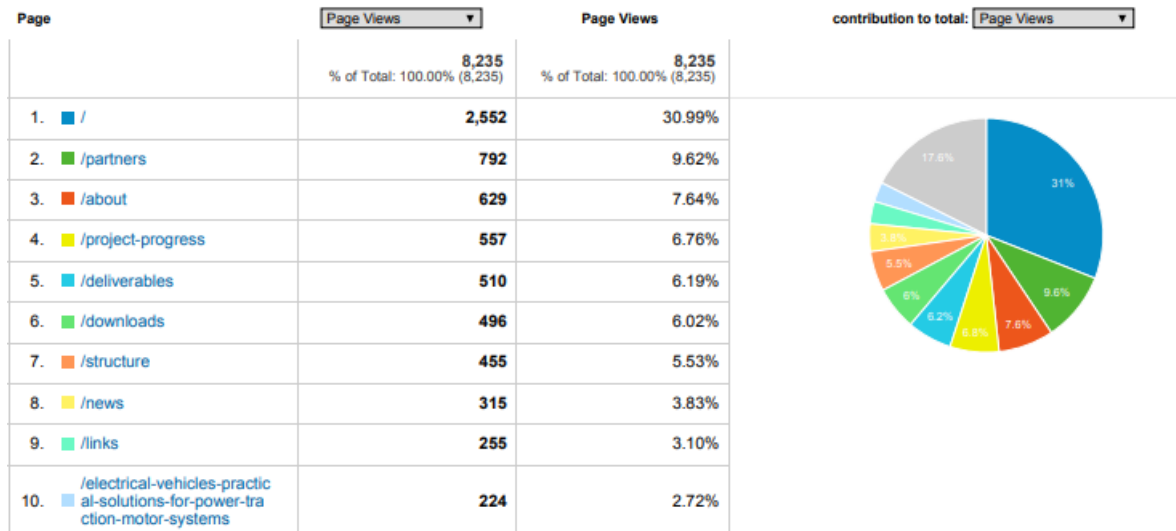


Figure 12: Website global page views report.

October 17 – July 19: Geographic location of visitors



Figure 13: Website visitors: geographic location report.

3.2

Leaflet and poster: first Release



Project Data

Title: Rare earth free e-Drives featuring low cost manufacturing

Acronym: ReFreeDrive

Grant Agreement No: 770143

Topic: GV-04-2017

Project Total Costs: 5,999,131.25€

Total EU Contribution: 5,999,131.25€

Project Coordinator: Fundación Cidaut

Partners: 13 partners from 6 EU Countries



Project Highlights

The project investigates the design of Induction Motors (IM) and Synchronous Reluctance Motors (SyncRel) (pure and assisted by Rare Earth Free Permanent Magnet) at different levels including electromagnetic design, materials investigation, power electronics, control algorithm and cooling. Two meaningful power ranges for electric vehicles (75kW and 200kW) will be designed and prototyped.

IM

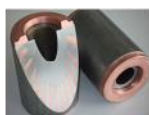
- Flat Wires;
- Fabricated Copper Rotor;
- Die-Cast Copper Rotor.

SyncRel

- Round Wires;
- Pure Reluctance Rotor;
- Rare Earth Free Permanent Magnet Assisted Rotor.

Common Actions

- Accurate Materials Selection;
- Custom Cooling system;
- Optimization Algorithms;
- Custom Control Algorithms;
- Scalability and Low Cost;
- Integrated electronics.



Project Objective

To develop rare earth-free traction technologies beyond their current state-of-art, with a strong focus on industrial feasibility for mass production, targeting lower costs with higher specific torque and power density.

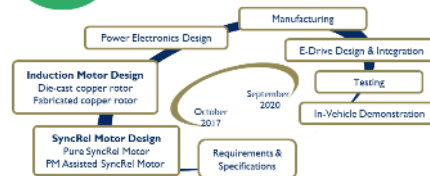


Project Motivations

The increasing demand of full electric vehicles arises specific challenges in terms of design for manufacturing, low weight, material costs and material supply chain.

To this extent the project aims to investigate motor-drive architectures featuring modular electric powertrain components and reduced use of critical raw materials.

Project Timeline



Partners Contributions

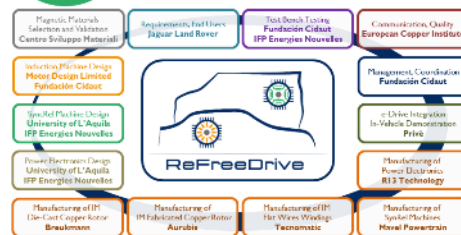


Figure 14: ReFreeDrive leaflet first release.

3.3

Newsletters

3.3.1

ECI 8th International Motor Workshop



Electric Motors
8th international workshop

19 March 2019
Brussels

European Copper Institute
Leonardo ENERGY

Register at <https://copper.fyi/motors8>

Join us

8th International Workshop on Electric Motors

19 Mar 2019 @ 9:00-13:15 CET
Location: Brussels

The workshop will present a series of technology innovations in the field of electric motors for industrial applications and will provide an update of the regulatory framework.

A new motor efficiency regulation is planned for implementation by January 2021 and the Circular Economy initiative is gaining new momentum. In response to this, new designs and manufacturing techniques are being developed. But these efforts also extend to the operational life of motors: how to get the highest efficiency in use and how to maintain and repair efficiently the existing assets are two questions that will be tackled during the workshop.

This session is the 8th in a series that started in back in 2011, initiated by the European Copper Institute to advocate for better motor energy performance and create a discussion forum between manufacturers, experts and users.

Participation in this event is free but registration is required (limited seats available).

(Participants in this workshop may also be interested in registering for the Workshop on high efficiency and low-cost drivetrains for electric vehicles, taking place at the same location in the afternoon. Three EU-funded projects will present their innovations to tackle the challenge of developing motors with reduced or no rare earth use.)

Join us for this event

* Email address:
(We only accept professional email)

* First (given) name:

* Last (family) name:

* Job title:

* Company or organisation:

* Country:

* Your participation:

Twitter user name (handle):

By clicking the button, you confirm that you agree that we store your personal data and use it to communicate with you about this and future events in accordance with our [Privacy Policy](#). You can opt-out of all communications or customize your preferences [here](#).


REGISTER


Figure 15: Leonardo Energy newsletter for 8th Int. Motor Workshop.


3.3.2 GV04 Joint Workshop.

Workshop on high efficiency and low-cost drivetrains for electric vehicles

19 March 2019
Brussels







Register at <https://copper.fyi/GV04>

Join us

Workshop on high efficiency and low-cost drivetrains for electric vehicles

19 Mar 2019 @ 13:00-16:30 CET

Location: Brussels

The workshop will present the innovations that are currently being developed by three EU-funded projects under the European Green Vehicles Initiative (EGVI): **ModuLED**, **ReFreeDrive** and **DRIVEMODE**.

These projects are expected to deliver an incremental reduction in total motor and power electronics system costs through optimised design for manufacture. A key challenge is to increase the specific torque and specific power of electric motors by 30%, with a 50% increase in maximum operating speed while halving motor losses. In addition, the motors will cost less because of a reduced need for rare earth magnets combined with new designs which have been optimised for lower cost manufacturing processes.

As for power electronics, the projects are expected to deliver a 50% increase in power density, a 50% reduction in losses and the ability to operate with the same cooling liquids and temperatures used for the combustion engine in hybrid configurations.

Participation to this event is free but registration is required (limited seats available).

(Participants in this workshop may also be interested in registering for a Workshop on industrial motors that will take place at the same location in the morning. Feel free to join)

Join us for this event

* Email address:
(We only accept professional email)

* First (given) name:

* Last (family) name:

* Job title:

* Company or organisation:

* Country:

Select...

* Your participation:

Select...

Twitter user name (handle):

By clicking the button, you confirm that you agree that we store your personal data and use it to communicate with you about this and future events in accordance with our [Privacy Policy](#). You can opt-out of all communications or customize your preferences [here](#).

REGISTER

Figure 16: Leonardo Energy newsletter for GV04 Joint Workshop.

3.3.3 Join us at Coiltech

Newsletter from ECI was released disseminating the Coiltech Event (Figure 17).

Dear colleagues,

At the occasion of the coil winding tradeshow [Coiltech and the World Magnetic Conference](#) (25-26 September, Pordenone, Italy), the [ReFreeDrive](#) team will present its key findings at the session P1 "[Advanced powertrains for electric vehicles](#)" on September 25th at 11h00 (room C9). We will be happy to meet you there.

[ReFreeDrive](#) project develops two technologies for electric vehicles without rare earths: copper rotor induction and synchronous reluctance. The motor design partners have reached the challenging benchmarks initially set in terms of power and torque density, matching those of its permanent magnet counterparts and reaching efficiency levels up to 96% (hear IFPEN, University of Aquila and Motor Design at 11h15). In parallel, the technology partners have fine-tuned their processes to deliver high quality and low cost manufacturing routes (meet Aurubis and Breuckmann at 11h50).

In the afternoon our fellow project [DriveMode](#) will be presented in session P2, with speeches of AVL, VTT and Semikron. DriveMode develops electric drives and compact integrated modular drivetrain components dedicated for mass produced electric and hybrid vehicles

Looking forward to seeing you there. We will circulate the presentation materials if you cannot make it.

Kind regards,

Fernando Nuño

European Copper Institute

Phone +34 670 80 46 37

Skype fnuno75

www.leonardo-energy.org

www.copperalliance.eu

Figure 17: Example of ECI newsletter.

3.3.4 ReFreeDrive @ World Magnetic Conference

Example of DEM released by Coiltech Organizer to promote the Participation of the EU projects @ Coiltech Conference (Figure 18), Italian version is reported but English version was sent to non-italian recipient.



Gentile XXXXX,

alla sua **decima edizione**, Coiltech si conferma un **punto di riferimento dell'industria elettromeccanica**, dove si danno appuntamento **i leader del settore**.

Nel 2010, abbiamo iniziato con 47 aziende espositrici, divise in 24 stand, in 1 solo Padiglione. 10 anni dopo, a Coiltech saranno presenti:

- oltre **420 espositori** provenienti da 26 nazioni;
- oltre **3.500 visitatori** provenienti da circa 50 Paesi (stima basata sulle pre-registrazioni);
- **59 presentazioni tecniche** in programma per la World Magnetic Conference.

Perché visitare Coiltech - cosa dicono i visitatori delle edizioni passate

"[...]"

Sono molto soddisfatto di tutte le aziende italiane e del resto d'Europa che ho incontrato. Sono molto soddisfatto della fiera e tornerò l'anno prossimo. "

V.L. - *IKM Elektro AS* - Norvegia

"[...]"

Coiltech è anche un **modo per incontrare tutti gli attori di questo settore** e nel corso degli anni ho notato che è **diventata più ampia, c'è più scelta, ho fatto più contatti.**"

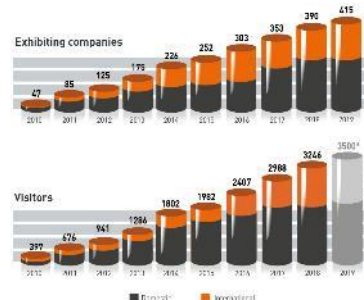
Y.H. - *AACO Manufacturing Srl* - Italia

"[...]"

Coiltech è un evento **molto interessante per fare networking** e per essere **sempre aggiornati sulle ultime innovazioni tecnologiche.**"

F.N. - *European Copper Institute* - Spagna

La conferenza #1 del suo settore



Coiltech è l'unica fiera del Coil Winding i cui dati sono certificati dall'ente indipendente ISFCERT e che ha l'approvazione internazionale UFI.

Può scegliere fra 59 presentazioni per aggiornare le sue competenze tecniche. Il concentrato di qualità e quantità che trova a Coiltech non è paragonabile ad altre fiere.



Uno dei focus di questa edizione sarà l'e-mobility.



La qualità della [World Magnetic Conference](#) è accentuata dalla presenza di **tre progetti 'Horizon2020'**, finanziati dall'UE, che hanno scelto Coiltech per la loro dissemination session in autunno 2019.

- **ReFreeDrive**: sviluppa **motori di trazione e-mobility** senza l'uso di terre rare e coinvolge 13 partner da 6 nazioni, tra i quali **Jaguar Land Rover**;
- **Drivemode**: sviluppa tecnologie integrate di motori, riduttori e inverter con l'obiettivo di ridurre il costo dei materiali e il "footprint" (l'orma CO2) e coinvolge 12 partner da 6 nazioni, tra le quali **Visedo Oy** (Danfoss Group) e **Semikron**;
- **FitGen**: mira a sviluppare un sistema di trazione elettrico integrato, pronto per l'implementazione nei veicoli elettrici di terza generazione.

Anche nel 2019, l'ingresso è libero

L'ingresso a Coiltech è gratuito per i visitatori registrati, ed è **consentito solo agli operatori del settore**. Pertanto, la preregistrazione è obbligatoria.

Per registrarsi subito, [clicchi qui e acceda al modulo di iscrizione](#). Le basteranno pochi minuti, noi chiediamo solo le informazioni indispensabili per la gestione degli ingressi.

Facciamo del nostro meglio per rendere facilmente reperibili tutte le informazioni rilevanti sul nostro sito web. Ci rallegra sempre, comunque, dare un supporto telefonico. Può raggiungerci al numero: +39 02 87 23 40 50.

Cordiali saluti,

Matteo Vezzini

Exhibition Manager Coiltech

QUiCKFairs®

Riceve questa mail a seguito di un contatto con noi in quanto professionista del settore Coil&Winding. Il nostro unico obiettivo è tenerla aggiornata in merito alla nostra fiera Coiltech. L'abbiamo aggiunta nella nostra mailing list e abbiamo dato dovuta informazione nei contatti passati. Ci assicuriamo che riceva come massimo 1 mail al mese. Come previsto nel GDPR, Lei può facilmente revocare la Sua richiesta, [cliccando su questo link](#). Per consultare la nostra informativa privacy, [clicchi qui](#).



Figure 18: Newsletter about ReFreeDrive @ Coiltech World Magnetic Conference.

3.4 Other Events

3.4.1 Special Session @ IECON Conference

Call for paper related to the Special Session organized at IECON is reported in Figure 19.



**THE 45TH ANNUAL CONFERENCE OF THE
IEEE INDUSTRIAL ELECTRONICS SOCIETY
OCTOBER 14-17, 2019
LISBON, PORTUGAL**

**Special Session on
“Electrical machines for e-mobility with reduced
rare-earth materials”**

Organized by
Mircea Popescu, Motor Design Ltd., UK
Marco Villani, University of L'Aquila, Italy
Fabrizio Marignetti, University of Cassino and South Lazio, Italy

Call for Papers

The expansion of the electric vehicle (EV) market will impact the socio-economic dimension of the transport sector. The introduction of new technologies for energy storage and powertrains play a critical role in the development of the EV market. At the motor level, key components and innovative materials must be integrated in the current motor designs. The vast majority solutions rely on permanent magnet technology using rare-earth magnets that offers a good compromise of high specific torque and low losses. However, the high and volatile cost of raw materials for magnets make uncertain their long term availability, especially since the electric traction technology is called to be developed at large scale in the future transportation system. As a consequence, alternative technologies not using rare-earth magnets or reduced rare-earth magnets are of high interest

Topics of interest include, but are not limited to:

- Synchronous motors with reduced rare-earth materials;
- Induction motor for EVs;
- Mechanical analysis of high speed motors for EVs;
- Cooling aspects;
- Modelling and control strategies.

Figure 19: Call for paper Special Session on Electrical Machines for e-mobility with reduced rare-earth materials.

3.4.2 ECI 8th motor workshop

The agenda of the stakeholder meetings ECI motor workshop is reported in Figure 20, participant list is reported in Table 8.



Figure 20: ECI Motor Workshop agenda.

Table 8: ECI motor Workshop participation list.

Full Name	Affiliation
Anibal De Almeida	ISR-University of Coimbra
Dusan Jakovljevic	EEIP
Fernando Nuno	ECI
Hans De Keulenaer	European Copper Institute
Serge Noels	ECI
Sebastian Kuester	Coiltech
Mircea Popescu	Motor Design Ltd.
Stefan Fassbinder	DKI Deutsches Kupferinstitut Berufsverband e. V.

Diedert Debusscher	European Copper Institute
Peter Walmsley	Aurubis
Gerson Freitas Junior	FATEC
Rob Serree	Sitech Services BV
Rudolf Moos	Breuckmann GmbH & Co. KG
François DOVERGNE	FAVI S.A.
Steven Jennings	Pierburg GmbH
Giuseppe Fabri	University of L'Aquila
Mauro Castello	Elica Spa
Thomas Marks	AEMT
Vincent Mallard	FAVI SA
Jos Habets	Sitech Services BV
Luca Barboni	Elica Spa
Nicolas Riviere	Motor Design Ltd
Marco Villani	University of L'Aquila
Mark Preston	Bellona Europa
Mohamed Ibrahim	Ghent university
Ahmed Abdallh	Flanders Make
Ajit Borundia	Flanders Make
Patrick Debal	Punch Powertrain
Guillaume Beckers	Flanders Make
Bishal Silwal	Ghent University
David Schmitz	Breuckmann GmbH & Co. KG
Nadia MOKHTARI	Punch Powertrain
Jeroen Stuyts	Flanders Make
Bharat Singh	KTM-Technologies GmbH
Mario Vetuschi	Tecnomatic
Frederic Beghain	EASA European & World Chapter
Andrea Marinelli	Tecnomatic spa
Giorgio Rossia	CNH
Federico Cartasegna	FPT Industrial S.p.A.
Kurt Stockman	Universiteit Gent
DANY PRIETO	Emotors PSA
Michael Wolf	Wieland Werke AG
Irini Vafiadis	Bellona Europa
Benjamin Verschaeve	Ghent University

3.5 Social Media

3.5.1 Common domain clustering all the active GV04 projects

Joint LinkedIn page “Electric Drivetrain Innovation Cluster” logo (Figure 21)



Figure 21: Electric Drivetrain Innovation Cluster Logo.

3.5.2 Common linkedIn page clustering all GV04 active projects

Figure 22 reports the main layout of the cluster's LinkedIn page.

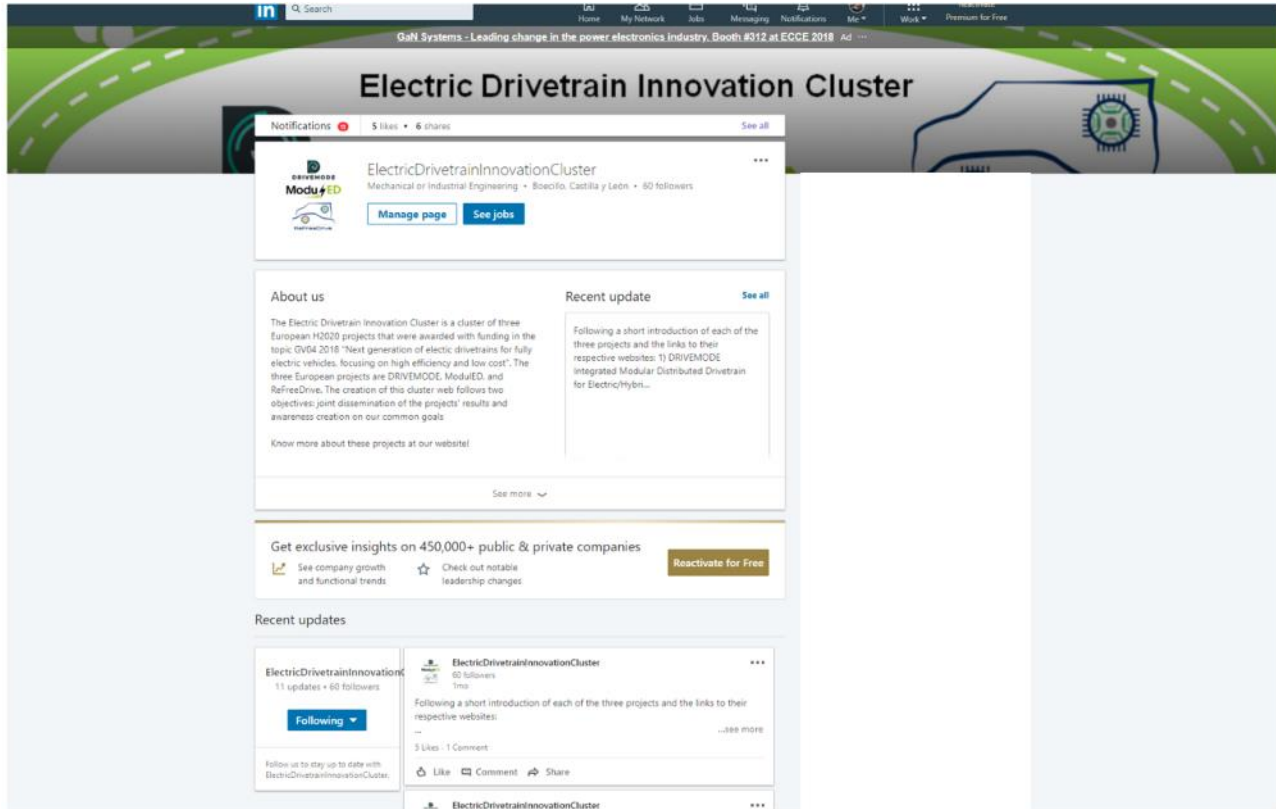


Figure 22: ReFreeDrive leaflet first release.

3.5.3 ReFreeDrive Workshop @Coiltech - World Magnetic Conference

Example of the LinkedIn Visitors campaign carried out by Coiltech staff including EU Projects ReFreeDrive, Drivemode and Fitgen (Figure 23).

The latest results in the field at the World Magnetic Conference (WMC)

On September 25/26, more than 50 speakers, including 18 from Universities, will be presenting their latest results this year at the WMC, organized in parallel to Coiltech, in Pordenone, Italy (near Venice).

The quality of the conference this year is underlined by the presence of **ReFreeDrive**, **DRIVEMODE**, and **FITGEN**. All projects are Horizon2020 R&D, financed by the EU, for the e-mobility who are committed to the public dissemination of research results in a highly technical context. For their fall 2019 dissemination session, they have chosen the **World Magnetic Conference** as their platform. See below their brief description:



Coiltech 2019
25-26 September - Pordenone - Italy



The ReFreeDrive project is focused on contributing to avoid the use of rare earth magnets through the development of a next generation of electric drivetrains, ensuring the industrial feasibility for mass production while focusing on the low cost of the manufacturing technologies.
www.refreedrive.eu



DRIVEMODE

The DRIVEMODE concept stems from the idea of integrating technologies to provide highly efficient and compact integrated modular drivetrain components dedicated to different kinds of cars. These include mass produced electric and hybrid vehicles, low performance and high performance vehicles and different types of heavy-duty vehicles.
<http://drivemode-h2020.eu/project/>



fitgen

FITGEN aims at developing a functionally integrated e-axle ready for implementation in third generation electric vehicles.
<http://www.fitgen-project.eu/>

Each project involves different partners, from several countries, including, for example, **Jaguar Land Rover**, **Visedo Oy - Danfoss Group**, and **Semikron**, among other companies and academics.

With this balanced mix between research results and industry representatives, you can be up-to-date with current innovations and best practices.

[Click here for the program of the conference.](#)

Access to each Conference Room is free of charge, no additional registration is required for

Figure 23: LinkedIn article for Coiltech visitors: campaign reporting EU projects event.

3.5.4 LinkedIn analytics after 12 month running of our cluster page:

The next graphs reports visitor's statistics (Figure 24, Figure 25, Figure 26) and follower statistics (Figure 27, Figure 28, Figure 29). Impression trend is reported in Figure 30 and detailed in Table 9, Table 10, Table 11.

a) Visitors

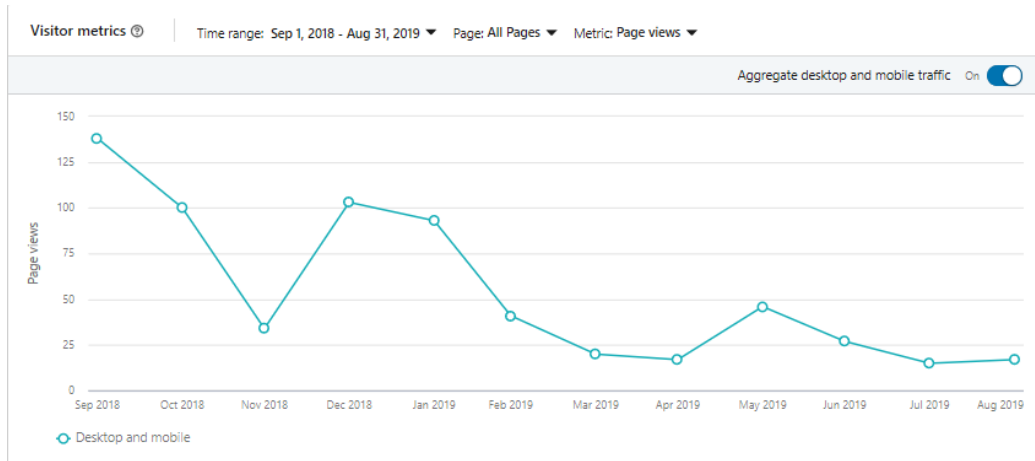


Figure 24: LinkedIn visitors: page views.

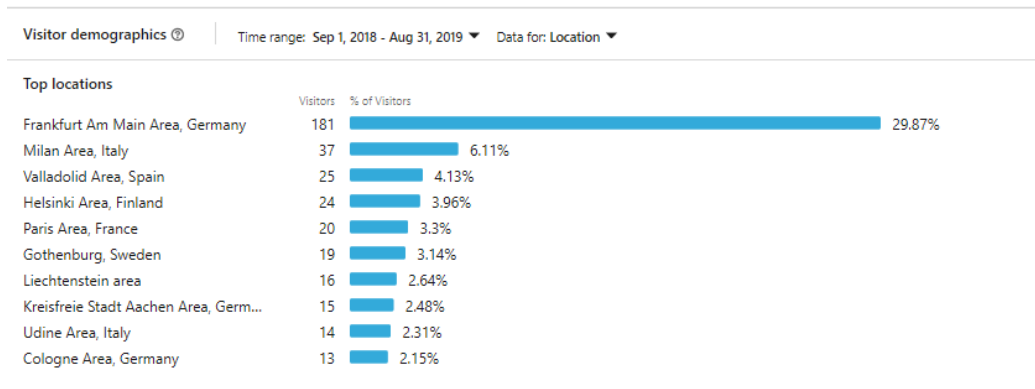


Figure 25: LinkedIn visitors: location.

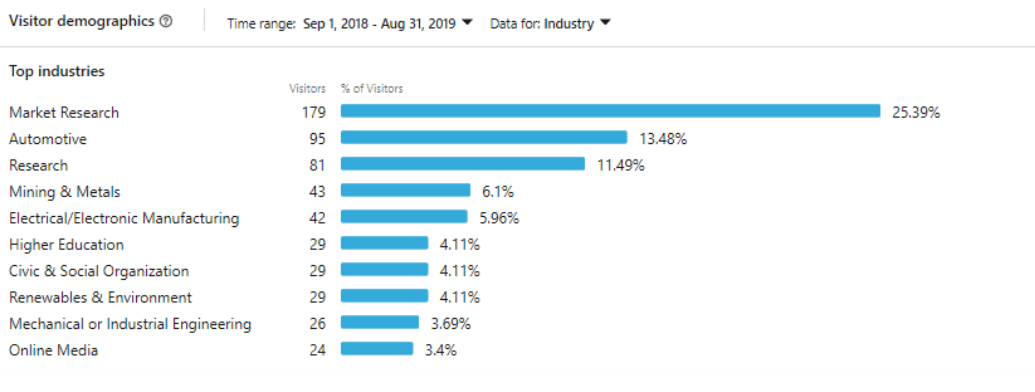


Figure 26: LinkedIn visitors: industry field.

b) Followers

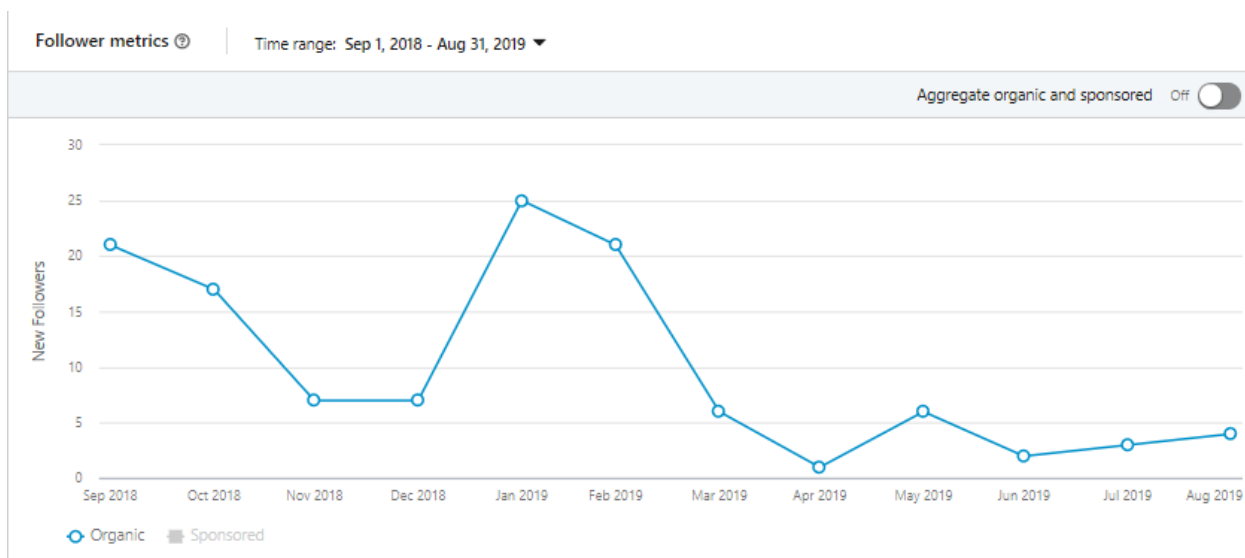


Figure 27: LinkedIn new followers: statistics.

Follower Demographics ⓘ

Data for: Location ▼

Top locations

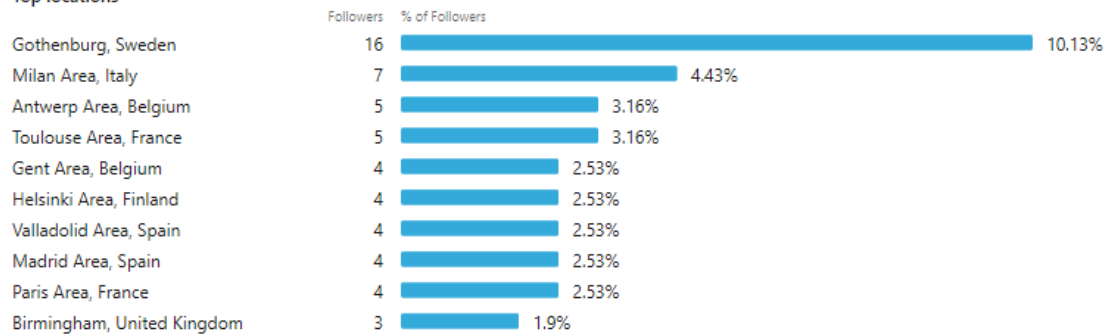


Figure 28: LinkedIn new followers: location.

Follower Demographics ⓘ

Data for: Industry ▼

Top industries

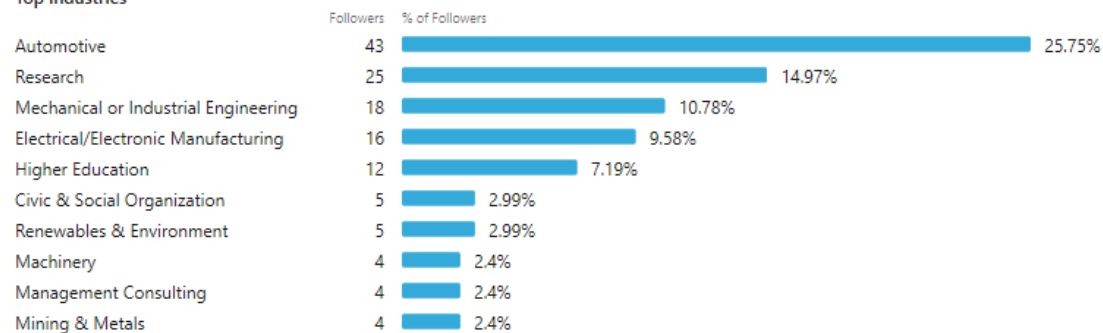


Figure 29: LinkedIn new followers: industry field.

c) Impressions:

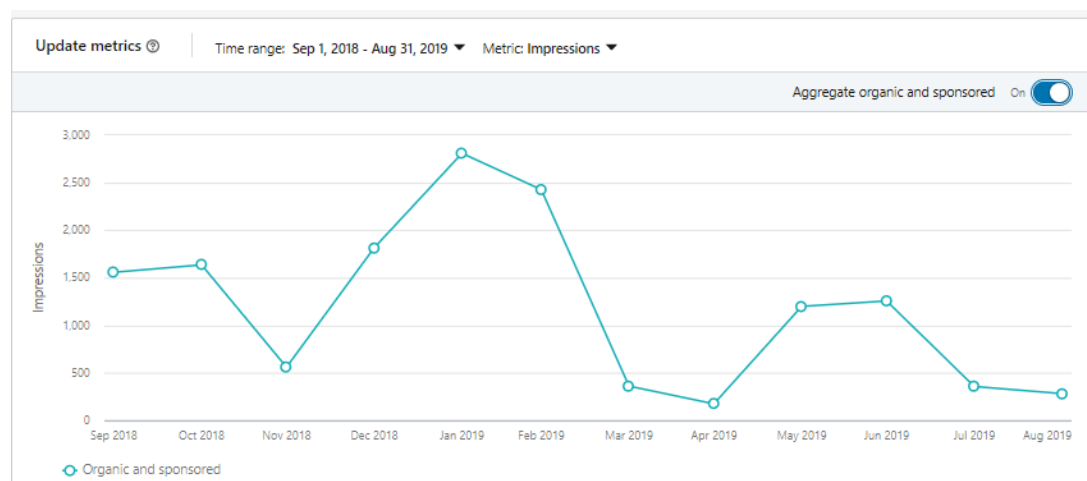


Figure 30: LinkedIn impressions

Table 9: Cluster page on LinkedIn detailed statistics, part A.

Update engagement ⓘ
Show: 10 ▼

Update title	Posted by	Created	Impressions	Video views	Clicks	CTR	Reactions	Comments	Shares	Follow
Two ReFreeDrive Partners will host a Special session at upcoming IECON Conference in... All followers	Tomas Jezdinsky	9/13/2019	144	-	6	4.17%	4	0	0	
IEEE ENERGY CONVERSION CONGRESS & EXPO All followers	Tomas Jezdinsky	9/10/2019	98	-	2	2.04%	3	0	0	
Provincia All followers	Tomas Jezdinsky	8/22/2019	225	-	7	3.11%	5	0	0	
Join us at Coiltech 2019 / World Magnetic Conference During the Coiltech ... All followers	Tomas Jezdinsky	6/26/2019	535	-	26	4.86%	12	0	0	
Towards the next generation of electric vehicles All followers	Marcello Bardellini	6/24/2019	202	-	8	3.96%	2	0	0	
Kolloquium Future Mobility All followers	Tomas Jezdinsky	6/14/2019	214	-	2	0.93%	4	0	0	
How Tesla is creating a revolution in power electronics All followers	Tomas Jezdinsky	6/11/2019	158	-	13	8.23%	3	0	0	
Rare earth NdFeB permanent magnets improving EV range All followers	Tomas Jezdinsky	6/6/2019	125	-	6	4.8%	2	0	0	
On the way to spur uptake of electric and hybrid mobility All followers	Marcello Bardellini	6/5/2019	269	-	22	8.18%	5	0	0	
Results from Joint GV04 workshop in Brussels: The workshop presented the ... All followers	Tomas Jezdinsky	5/21/2019	359	-	7	1.95%	6	0	0	

Previous
1 2 3 4
Next

Table 10: Cluster page on LinkedIn detailed statistics, part B.

Update engagement ⓘ										
Show: 10 ▾										
Update title	Posted by	Created	Impressions	Video views	Clicks	CTR	Reactions	Comments	Shares	Follow
Get all the latest news about innovation for electric vehicles at the upcoming EV532 ... All followers	Dorian Odde	5/15/2019	237	-	6	2.53%	2	0	3	
Electric cars: current trends make for a shocking change All followers	Marcello Bardellini	5/13/2019	201	-	4	1.99%	3	0	1	
Call for Papers All followers	Tomas Jezdinsky	5/2/2019	272	-	10	3.68%	7	0	0	
DRIVEMODE is about to issue its newsletter! Join #DRIVEMODEH2020 & stay tuned with... All followers	Marcello Bardellini	4/16/2019	224	-	2	0.89%	3	0	0	
On 26th of Feb, Project Partner Cidaut will be at the World Resources Forum taking ... All followers	Tomas Jezdinsky	2/18/2019	446	-	14	3.14%	7	0	2	
H2020RTR18 European Conference: Report now available download here: ... All followers	Tomas Jezdinsky	2/18/2019	403	-	8	1.99%	6	0	1	
Colitech World Magnetic Conference 2018, Evaluating Electrical Steels for Electric ... All followers	Tomas Jezdinsky	1/31/2019	635	-	42	6.61%	12	0	1	
Colitech World Magnetic Conference 2018, Adoption of the Induction Motor with ... All followers	Tomas Jezdinsky	1/30/2019	694	-	31	4.47%	13	1	3	
Colitech World Magnetic Conference 2018, Rare earth free PM Assisted Synchronous ... All followers	Tomas Jezdinsky	1/24/2019	842	-	57	6.77%	20	0	1	
Colitech World Magnetic Conference 2018, Synchronous Reluctance Motor for Tractio... All followers	Tomas Jezdinsky	1/18/2019	341	-	6	1.76%	7	0	2	
<div> <div>Previous</div> <div>1 2 3 4</div> <div>Next</div> </div>										

Table 11: Cluster page on LinkedIn detailed statistics, part C.

Update engagement ⓘ										
Show: 10 ▼										
Update title	Posted by	Created	Impressions	Video views	Clicks	CTR	Reactions	Comments	Shares	Follow
Upcoming Electric Motors from BMW Will Be Free of Rare Earths All followers	Tomas Jezzinsky	1/18/2019	604	-	55	9.11%	10	2	2	
PowerPoint Presentation All followers	Tomas Jezzinsky	1/10/2019	192	-	6	3.13%	5	0	0	
Want to know more about the ModuLED project? Discover the project's objectives ... All followers	Dorian Oddo	1/9/2019	679	-	40	5.89%	16	0	2	
ReFreeDrive held its own dissemination session as part of the Coiltech internation... All followers	Tomas Jezzinsky	12/12/2018	350	-	3	0.86%	7	0	1	
ReFreeDrive at Coiltech All followers	Tomas Jezzinsky	12/4/2018	1,389	3	25	1.8%	18	2	2	
Tesla's shift to a magnetic motor using neodymium in its Model 3 adds to pressur... All followers	Tomas Jezzinsky	10/30/2018	443	-	29	6.55%	6	0	1	
China cutting rare earth output, unnerving global manufacturers All followers	Tomas Jezzinsky	10/30/2018	316	-	11	3.48%	8	0	5	
DRIVEMODE Animation video All followers	Marcello Bardellini	10/24/2018	357	-	20	5.6%	7	1	2	
MOTOR SUMMIT 2018 All followers	Tomas Jezzinsky	10/12/2018	388	-	17	4.38%	7	2	1	
#H2020RTR18 European Conference: Results from Road Transport Research in H2020 ... All followers	Bernard STREE	10/9/2018	224	-	11	4.91%	3	0	0	
<div> <div>Previous</div> <div>1 2 3 4</div> <div>Next</div> </div>										
Update engagement ⓘ										
Show: 10 ▼										
Update title	Posted by	Created	Impressions	Video views	Clicks	CTR	Reactions	Comments	Shares	Follow
Oil flows and churning torque prediction in DRIVEMODE transmission All followers	Marcello Bardellini	10/8/2018	366	-	16	4.37%	10	0	1	
ReFreeDrive Dissemination session @ #Coiltech 2018 Next week, ReFreeDrive ... All followers	Tomas Jezzinsky	9/20/2018	876	-	27	3.08%	6	0	6	
<div> <div>Previous</div> <div>1 2 3 4</div> <div>Next</div> </div>										