

ReFreeDrive

Rare earth free e-drives featuring
low cost manufacturing

Blanca Araujo, Fundación CIDAUT





Foundation CIDAUT is a R&D Centre which promotes scientific investigation, technological development and innovation applicable to industry in general and to the transport and energy sectors in particular.

400 Industrial clients

72 Millions Euros
R&D facilities and equipments

17,16 Millions Euros
2017 Turnover

3 Headquarters
Spain, Germany and México

15 New Technology Based Firms

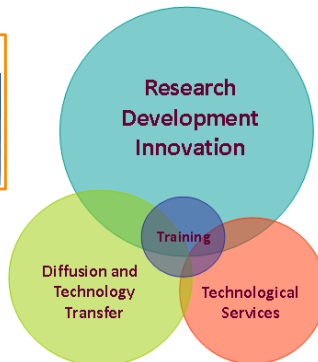
23.304 m²
Total surface

38 Patents

Our mission is

To increase competitiveness and industrial development of companies operating mainly in the transport and energy sectors

Strengthening their industrial fabric by increasing their technological capabilities, allowing the development of new products and processes

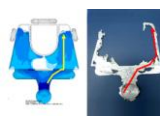


the world is our marketplace

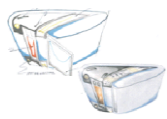


MATERIALS - PRODUCT - PROCESS

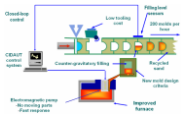
LIGHT ALLOYS



PRODUCT DESIGN



PROCESS DESIGN



MATERIALS



ACOUSTICS & VIBRATIONS



ENERGY AND ENVIRONMENT

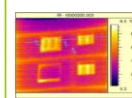
BIOMASS



ALTERNATIVE FUELS



EFFICIENT BUILDING



HYDROGEN TECHNOLOGIES



PROPULSION SYSTEMS



MAINTENANCE & DIAGNOSTIC



SAFETY ON TRANSPORT

ACTIVE SAFETY



PASIVE SAFETY



ACCIDENTOLOGY



ROAD INFRASTRUCTURE



HUMAN FACTOR



MOTORIST SAFETY



MOBILITY

SMART TRANSPORT



SUSTAINABLE MOBILITY



MOBILE ENGINEERING



BIOMEDICAL ENGINEERING



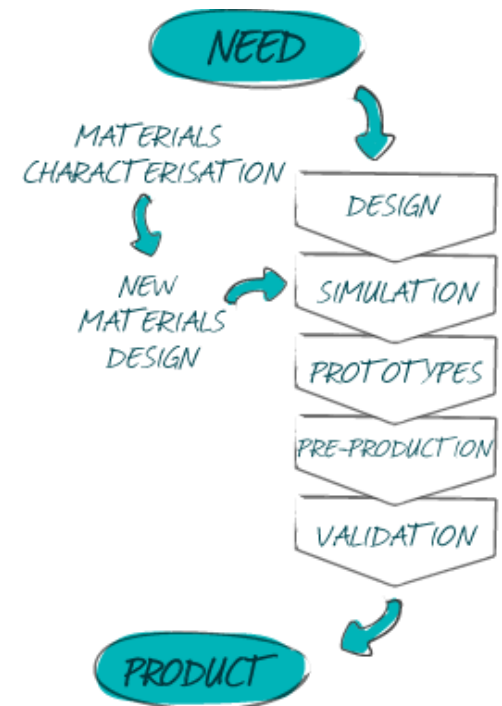
The keys to our success

CIDAUT carries out each and every stage of product development from the conception of a new idea, selection and analysis of materials, simulation activities, processing, prototype product and tooling design and manufacturing and pre-industrialization tasks, including the final validation of the product.

CIDAUT generates the necessary knowledge and manages its transference to the customers, so they can achieve their own goals and a greater competitiveness in the market.

More than 400 industrial customers are enough assurance to validate that our methodology is working

- ✗ Exclusivity
- ✗ Confidentiality
- ✗ Knowledge transfer



Complete product development cycle

Our work methodology is guarantee for success



ReFreeDrive Project Overview

General Figures

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€

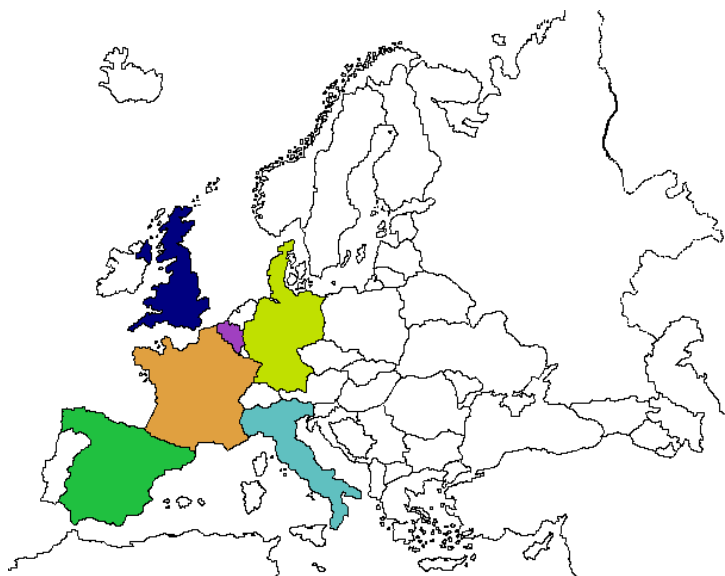
Total EU Contribution: 5,999,131.25€



ReFreeDrive Project Overview

Project Partners and Locations

ReFreeDrive Consortium is composed of 13 partners in six European countries



3

UNITED KINGDOM

European Copper Institute
Motor Design Limited
Jaguar Land Rover

1

BELGIUM

Aurubis

1

FRANCE

IFP Energies Nouvelles

6

ITALY

Università degli studi dell'Aquila
Rina - Centro Sviluppo Materiali
Tecnomatic
Mavel
R13 Technology
Privé

1

SPAIN

Fundación Cidaut

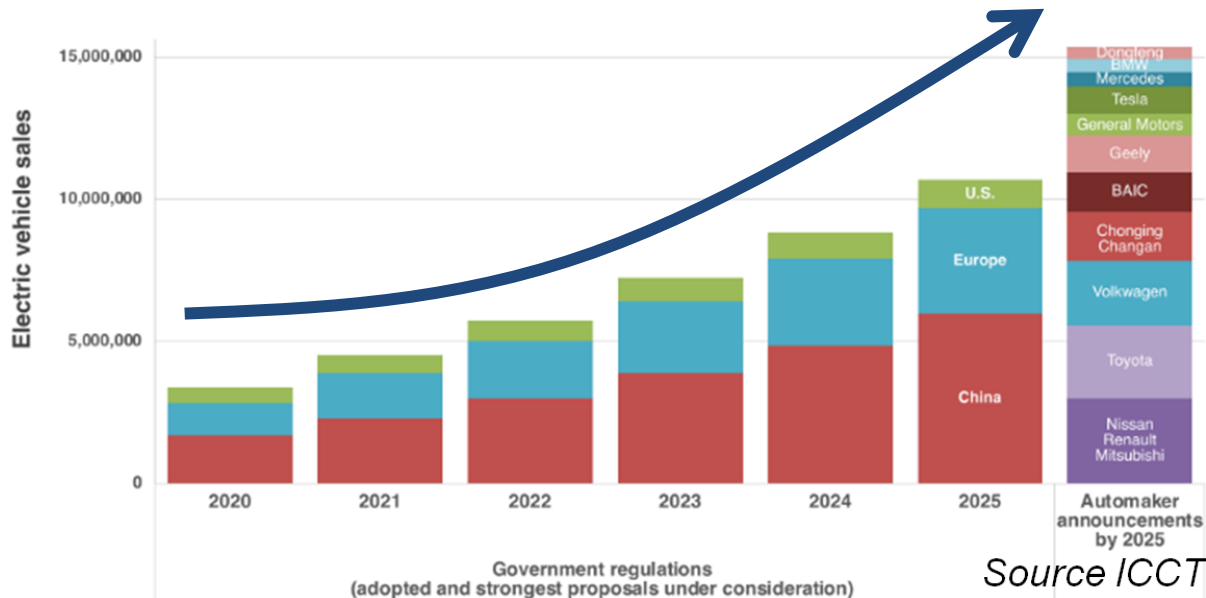
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GERMANY

MetallGiesserei
Breuckman

ReFreeDrive Project Overview

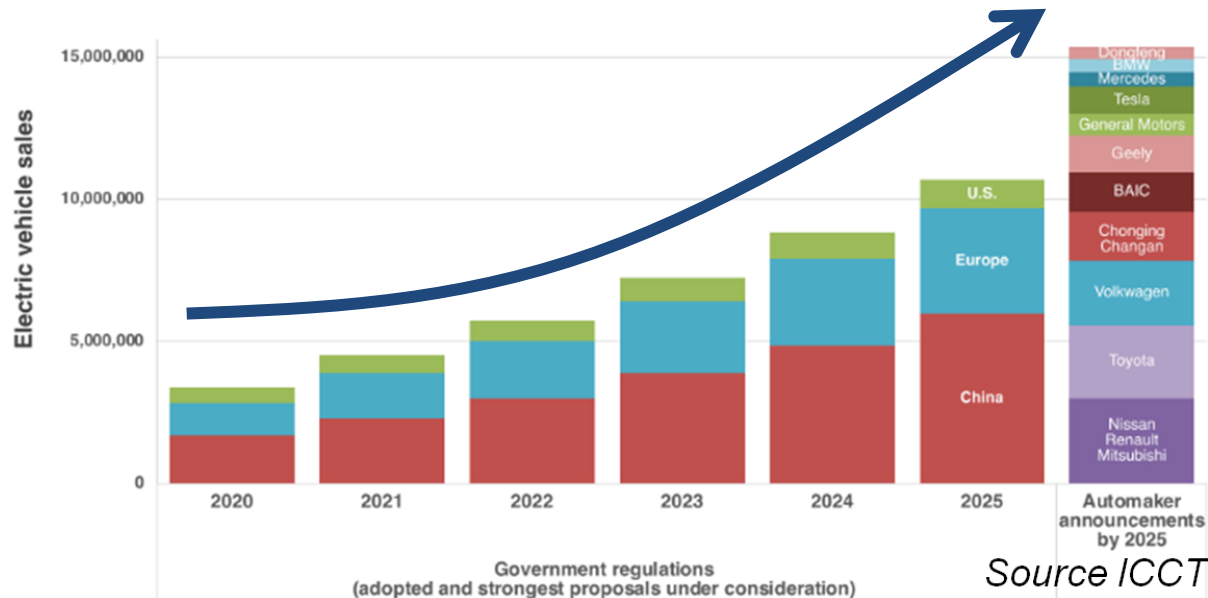
Why e-Drives? Facts about electric vehicles



“Just 20 cities account for about 40% of the world’s electric vehicles”

ReFreeDrive Project Overview

Why e-Drives? Facts about electric vehicles

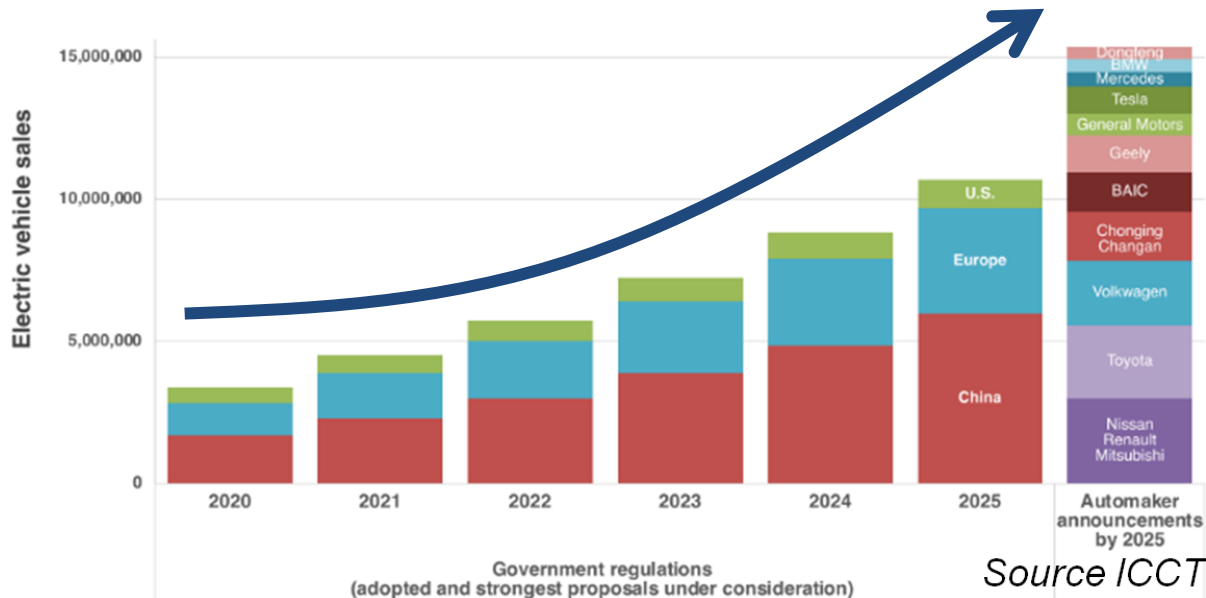


“Just 20 cities account for about 40% of the world’s electric vehicles”

“Cities are developing innovative ways to support the electric vehicle market”

ReFreeDrive Project Overview

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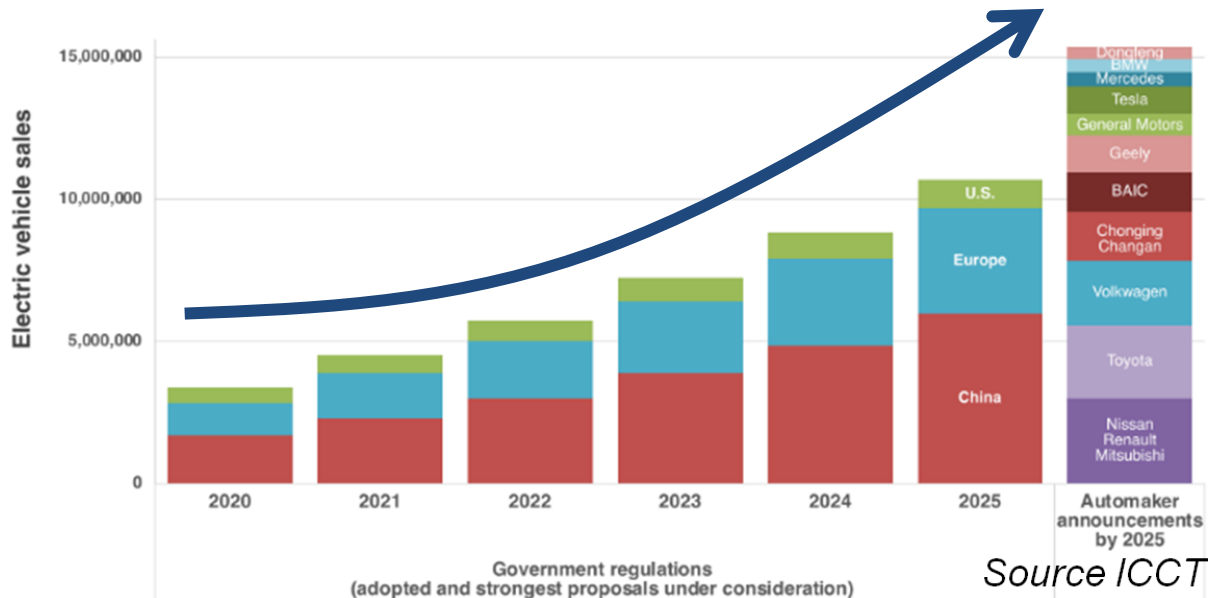
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ReFreeDrive Project Overview

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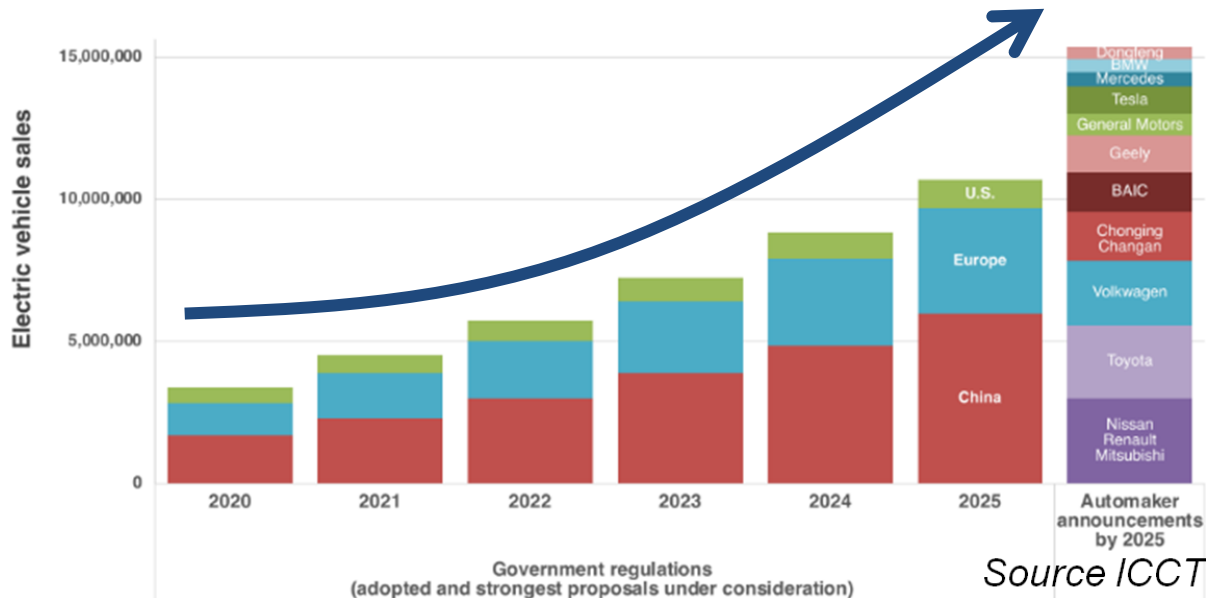
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ReFreeDrive Project Overview

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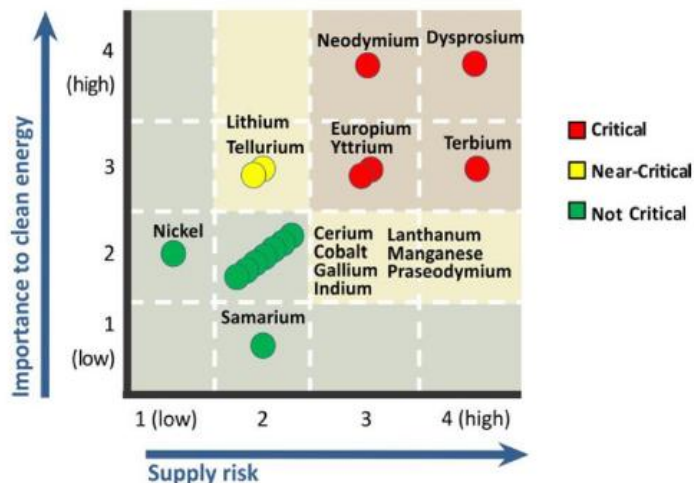
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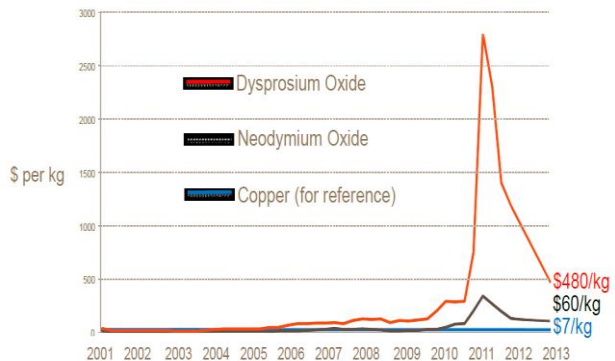
“Accelerating the transition to electric requires a comprehensive suite of actions”

ReFreeDrive Project Overview

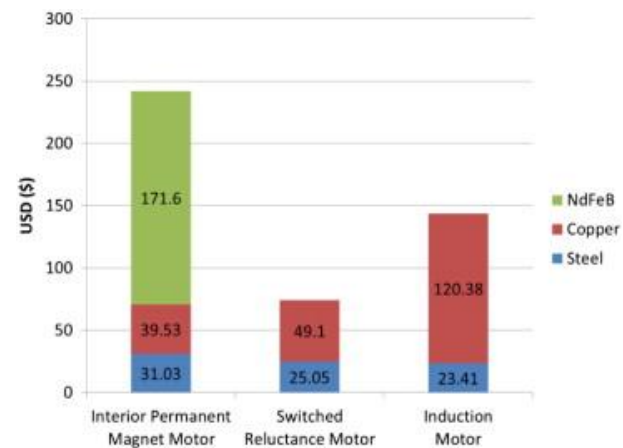
Why rare earth elements free?



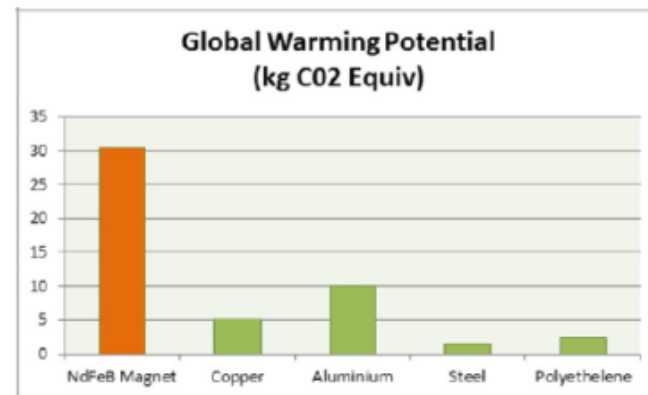
SUPPLY RISK



MARKET UNCERTAINTIES



COST



ENVIRONMENT & LCA

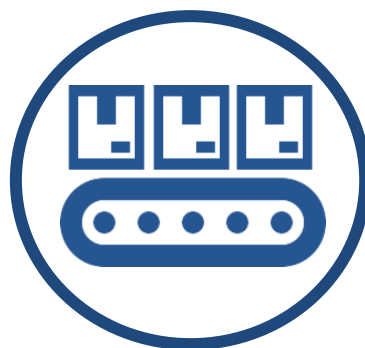
ReFreeDrive Project Overview

Project Objectives

- The main aim of this project is to develop **rare earth-free traction technologies**



**INDUSTRIAL
FEASIBILITY**



**MASS
PRODUCTION**



**LOWER
COSTS**

ReFreeDrive Project Overview

Target figures



**INCREASE
SPECIFIC
TORQUE BY 30%**



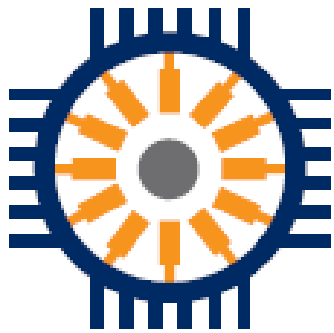
**REDUCE MOTOR
LOSSES BY 50%**



**15% COST
REDUCTION AGAINST
SIMILAR SOLUTIONS**

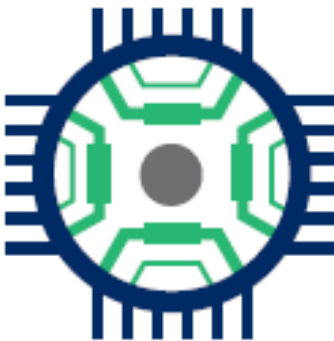


**INCREASE POWER
DENSITY IN POWER
ELECTRONICS BY
50%**



Induction machines with copper rotor

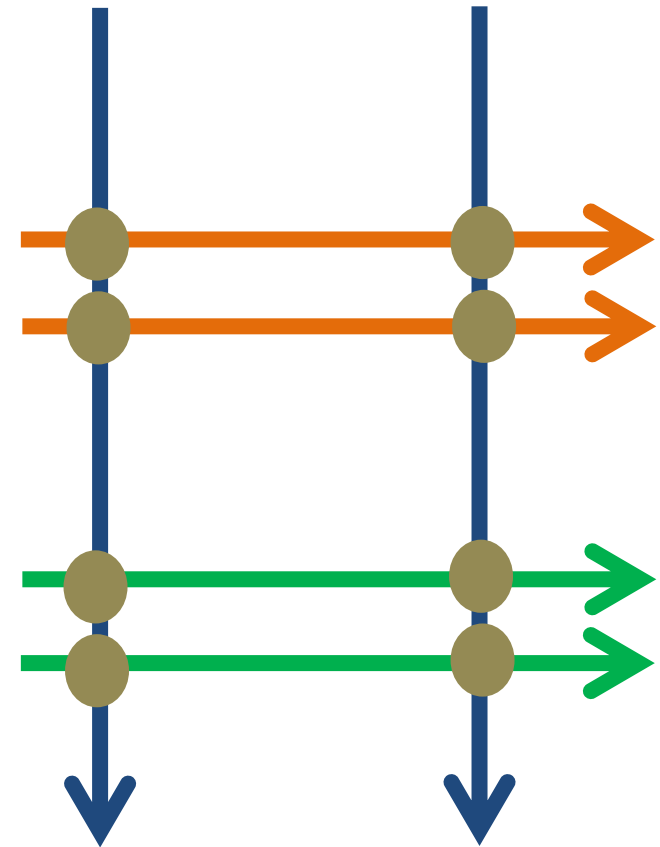
Fabricated
Die Cast



Synchronous reluctance machines

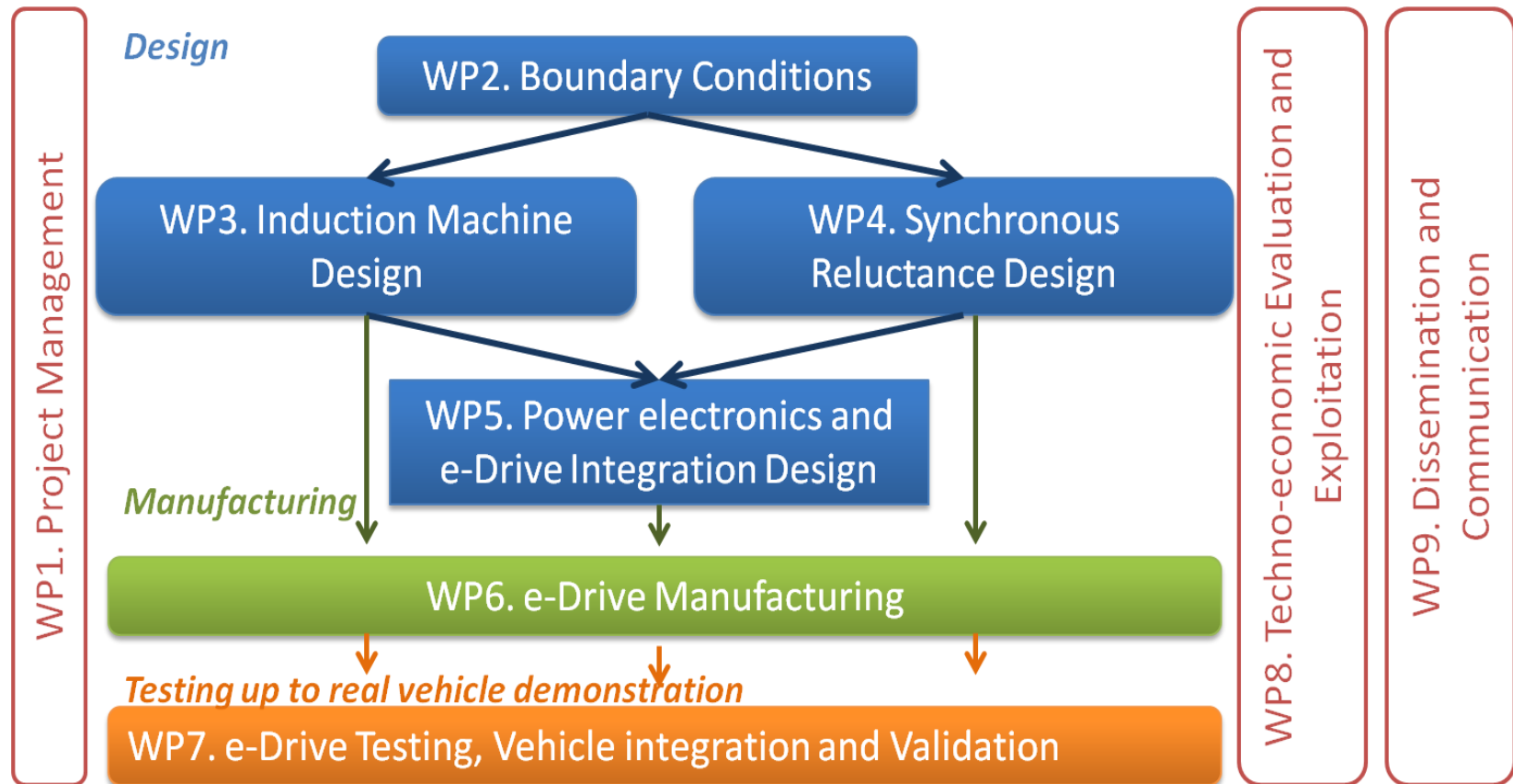
PMassisted
Without PM

75kW and 200kW



ReFreeDrive Project Overview

Project Structure





ReFreeDrive Project Overview

Consortium tasks

priv^e

Requirements &
Specifications

End Users:

Jaguar Land Rover



ReFreeDrive Project Overview

Consortium tasks

privé
Requirements & Specifications

Design

**Induction
Machine with
copper rotor**

Die cast copper rotor
(75kW and 200kW)

Fabricated copper rotor
(75kW and 200kW)

**Synchronous
Reluctance
Machine**

Pure SynRel machine
(75kW and 200kW)

Low Cost Permanent Magnet
SynRel (75kW and 200kW)

Designers



European
Copper Institute
Copper Alliance

Motor
Design
Limited



Foundation
cidaut
Transport and Energy Research and Development



Aurubis

Breuckmann



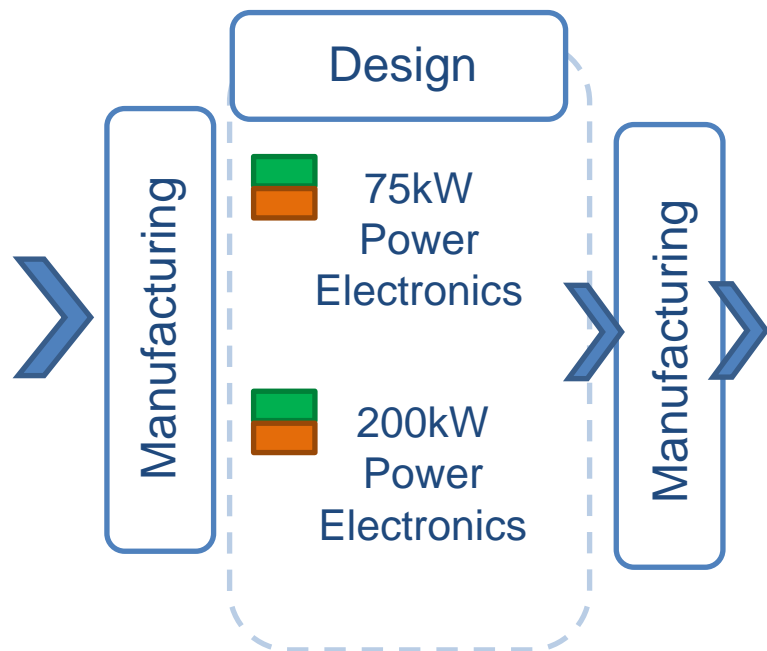
Manufacturers

End Users:
Jaguar Land Rover



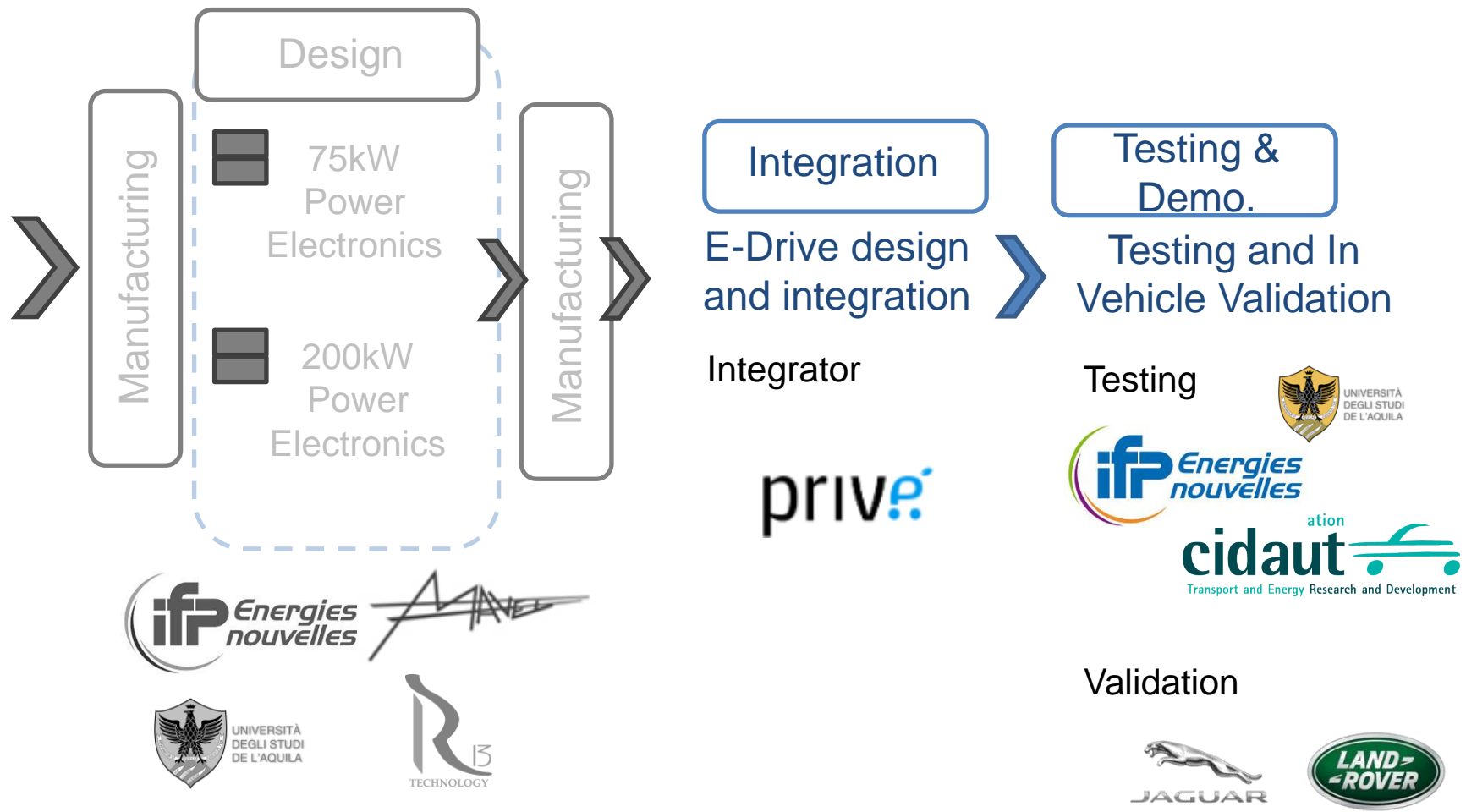
ReFreeDrive Project Overview

Consortium tasks



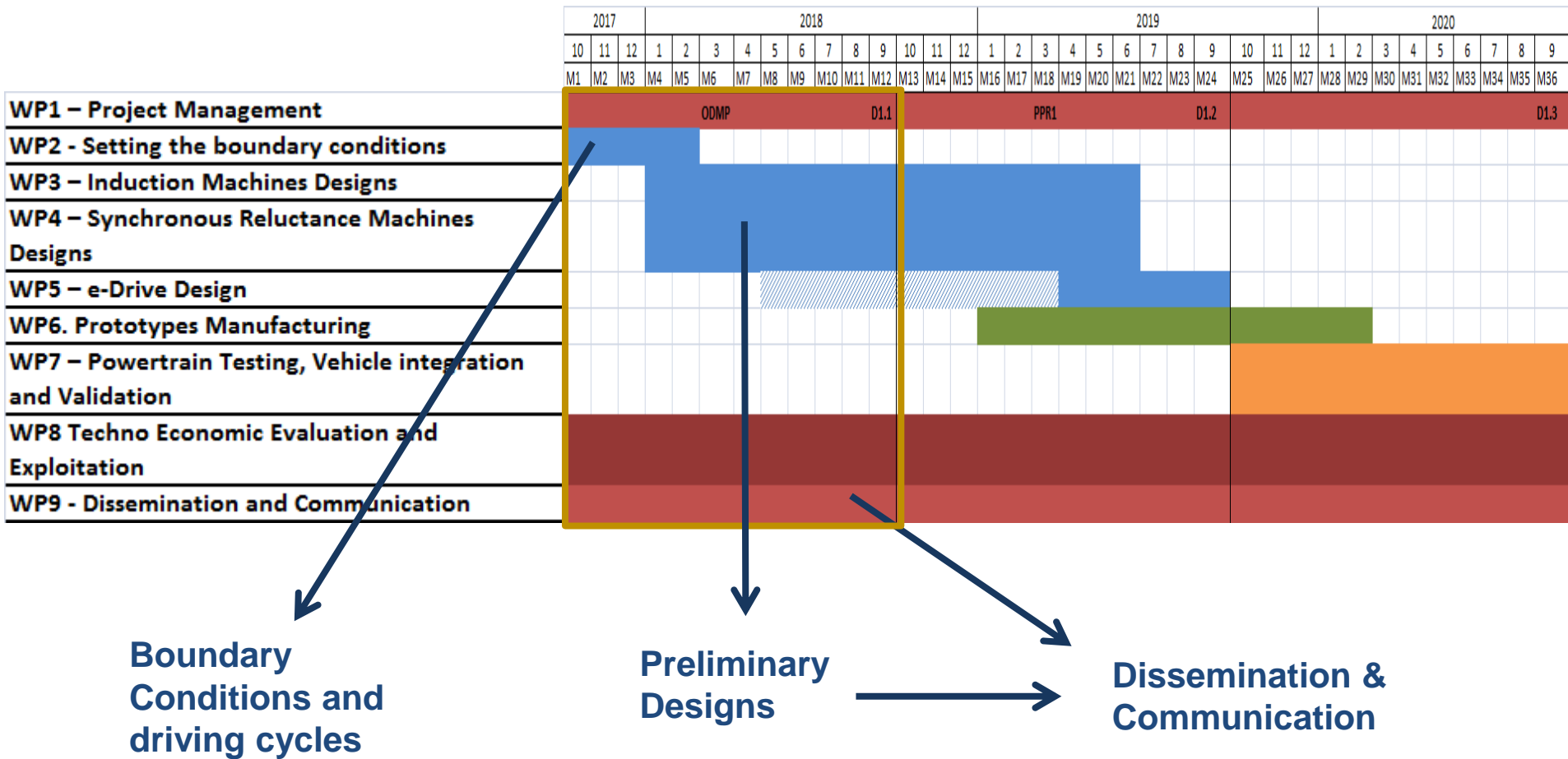
ReFreeDrive Project Overview

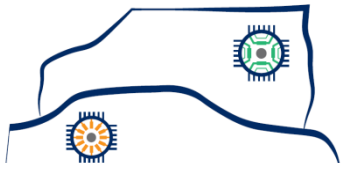
Consortium tasks



ReFreeDrive Project Overview

First Year





www.refreedrive.eu



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Induction and Synchronous Reluctance Machines for electric vehicle drives

Rare Earth Free e-drives featuring low cost
manufacturing

LATEST NEWS





ReFreeDrive in the Electric Drivetrain Innovation Cluster



<https://www.linkedin.com/company/electric-drivetrain-innovation-cluster/>

Contact us



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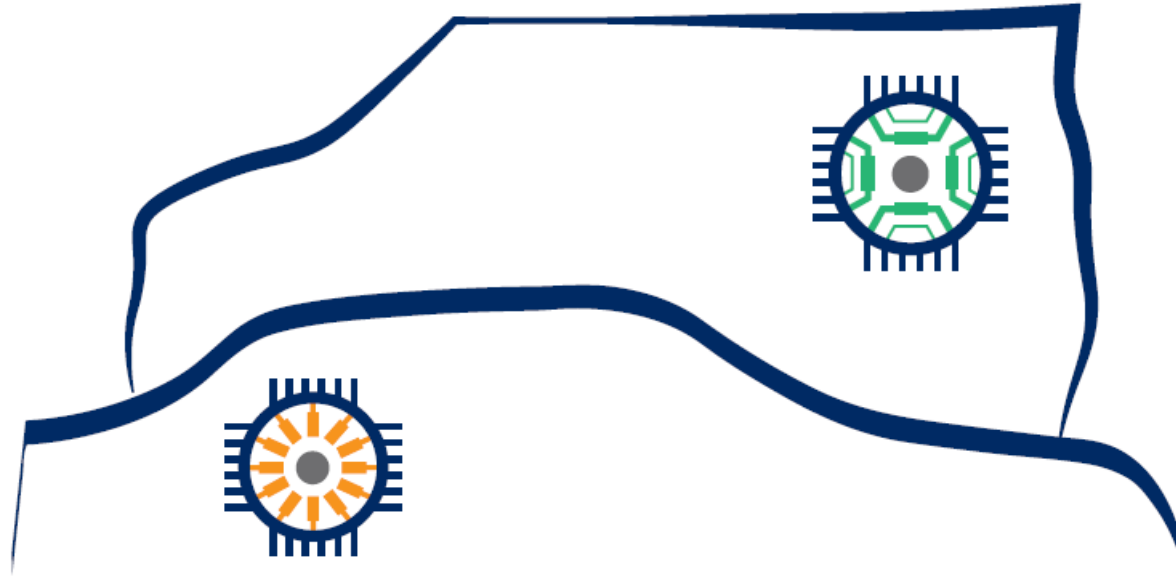


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ReFreeDrive

Thank you for your attention!

