



Feasibility analysis and development of on-road charging solutions
for future electric vehicles

Online collaboration platform (OCP)

Deliverable No.		D1.2.1	
Workpackage No.	WP1.2	Workpackage Title	Operational and technical management
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Status (Final; Draft)		Final	
Dissemination level (Public; Restricted; Confidential)		Public	
Project start date and duration		01 January 2014, 48 Months	
Revision date		2014-03-10	
Submission date		2014-02-12	



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 605405

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LIST OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
CVS	Concurrent Versions System
DMSF	Document Management System Features
EV	Electric Vehicles
GPL	General Public Licence
HTML	HyperText Markup Language
ICT	Information and communications technology
LDAP	Lightweight Directory Access Protocol
OCP	Online Collaboration Platform
SCM	software configuration management
SVN	Subversion
URL	Uniform Resource Locator
WebDAV	Web Distributed Authoring and Versioning
WYSIWYG	What You See Is What You Get

REVISION CHART AND HISTORY LOG

REV	DATE	REASON
1	07/02/14	First Draft
2	12/02/14	Final version

EXECUTIVE SUMMARY

The online collaboration platform allows a group of people to have access to documents, to manage them and to upload new ones that will then be available to their collaborators. In addition it allows communication among the partners with electronic means such as emails or electronic forums. Advanced features of an online collaboration platform that is focused on project management include work monitoring tools such as GANTT charts, and tracking tools that allow every member of the project to follow the progress of a specific common task. In FABRIC such a platform has been setup since the beginning of the project according to the Description of Work. The FABRIC online collaboration platform is based on the free to use platform "Redmine" [2], it is functional since the beginning of the project and more than 80 people already have access to its contents and are also able to contribute. In this document the description of the platform functionalities and its contents at the moment of writing are included.

1. INTRODUCTION

FABRIC consortium brings together key partners and stakeholders that are involved in the development and implementation of mobility and transport solutions in general, and on-road charging of EVs in particular, encompassing the automotive manufacturing industry, infrastructure management, grid management and ICT technologies within a single cohesive group. FABRIC consortium comprises 24 partners from 9 different European countries. To coordinate the activities of the consortium and keep every partner up-to-date with the developments within the project, it is essential to have an online collaboration platform.

According to the description of work a project-restricted collaboration platform and several e-mailing lists were set up and maintained by the Project Secretariat (ICCS). The collaboration platform allows sharing and storing documents in a structured way, assigning tasks, and scheduling meetings.

E-mailing lists were set up as needed and they constitute an effective way for targeted group communication. The Project Secretariat takes care that access rights of both the collaboration platform as well the mailing lists are granted in full compliance with the Grant Agreement and Consortium Agreement. To increase transparency, a contact list with all project members was created and it will be updated as needed during the whole duration of the project.

This document describes the online collaboration platform of FABRIC, it includes the e-mailing lists and contact details of the project members and provides a snapshot of the platform's contents at the moment of writing.

2. REDMINE DESCRIPTION

Redmine [2] is a free and open source, web-based project management and bug-tracking tool. It includes a calendar and Gantt charts to aid visual representation of projects and their deadlines. It can handle multiple projects. Redmine provides integrated project management features, issue tracking, and support for various version control systems.

The design of Redmine is significantly influenced by Trac [3], a software package with some similar features.

Redmine is written using the Ruby on Rails [4] framework. It is cross-platform and cross-database. It is part of the Bitnami [5] app library that provides an installer and virtual machine for ease of deployment.

Redmine is released under the terms of the GNU [1] General Public License v2 (GPL).

2.1 FEATURES

Some of the main features of Redmine are:

- Multiple projects support
- Flexible, role based access control
- Flexible issue tracking system
- Gantt chart and calendar
- News, documents & files management
- Feeds & email notifications
- Per project wiki
- Per project forums
- Time tracking
- Custom fields for issues, time-entries, projects and users
- SCM integration (SVN, CVS, Git, Mercurial, Bazaar and Darcs)
- Issue creation via email
- Multiple LDAP authentication support
- User self-registration support
- Multilanguage support
- Multiple databases support

2.2 REGISTRATION PROCESS

Depending on the Redmine settings, the user will have to either **activate his account by email, wait for an administrator to validate his account** or **see his account automatically activated**.

2.2.1 Account Activation by Email

After providing the information required on the Registration page, the user will receive an email to the email provided on the Registration page. By clicking on the activation link provided in the email, the user validates his account.

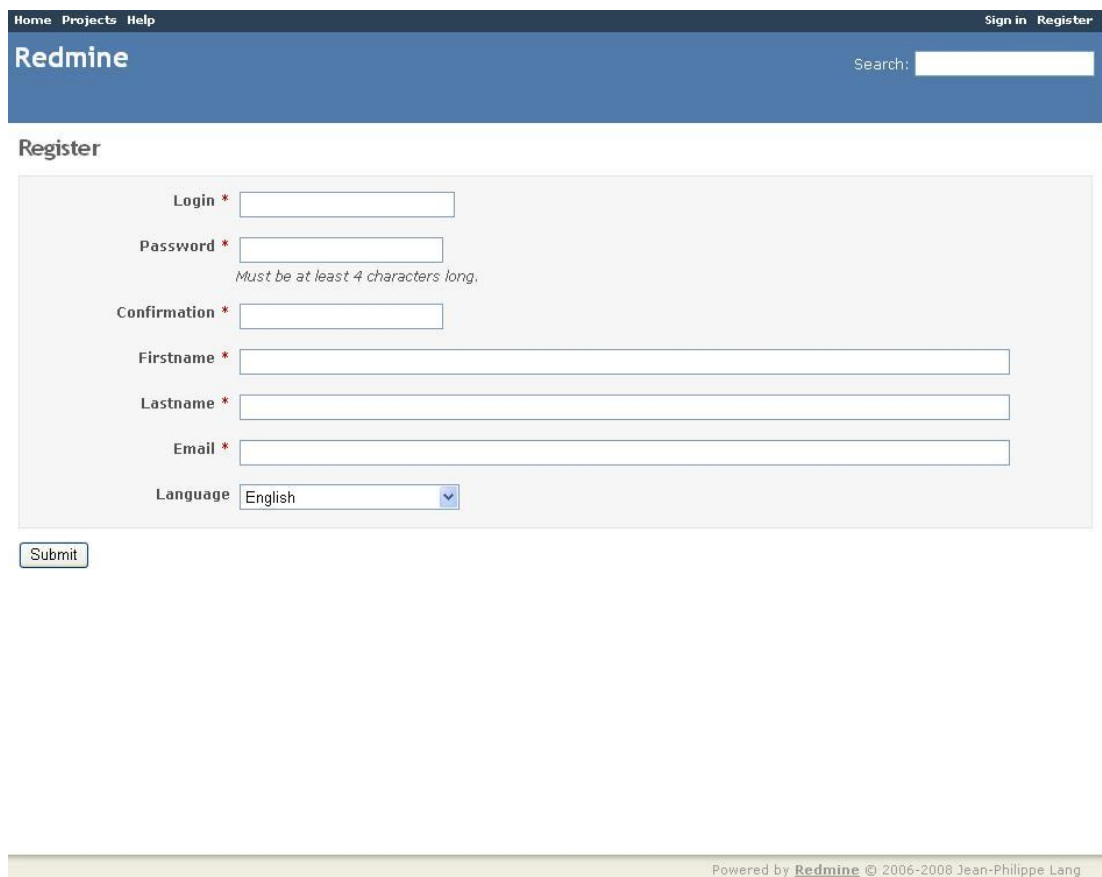
Such method is often used to prevent email spamming.

2.2.2 Manual Account Activation

After providing the information required on the Registration page, the user must wait for the approval of an administrator. The administrator, by logging into the Administration panel, will validate the user account. When the user account is enabled, the user has access to the project.

2.2.3 Automatic Account Activation

After providing the information required on the Registration page, the user is allowed to login at any moment, no further steps are required.



The screenshot shows the Redmine user registration interface. At the top, there is a navigation bar with links for 'Home', 'Projects', and 'Help'. On the right side of this bar are links for 'Sign in' and 'Register'. Below the navigation bar is a blue header area with the 'Redmine' logo on the left and a search bar on the right. The main content area is titled 'Register' and contains a form with the following fields: 'Login' (required), 'Password' (required, with a note 'Must be at least 4 characters long.'), 'Confirmation' (required), 'Firstname' (required), 'Lastname' (required), 'Email' (required), and 'Language' (a dropdown menu currently set to 'English'). A 'Submit' button is located at the bottom left of the form. At the bottom right of the page, there is a footer that reads 'Powered by Redmine © 2006-2008 Jean-Philippe Lang'.

Figure 1. REDMINE user registration form

In FABRIC online collaboration platform, only the administrator can create member accounts for security reasons. The administrator uses the email address to fill in the necessary information and create the login credentials for the new member. After this is done, the system automatically sends the login credentials to the new member who is now able to access the platform.

2.3 PROJECT SETTINGS

In this screen the administrator can configure the settings for the selected project.

Settings

Information Modules Members Versions Issue categories Wiki Repository Forums

Name * SFooBar
30 characters maximum.

Description **B** **I** **U** **S** **C** **H1** **H2** **H3** **UL** **OL** **PRE** **CODE** **IMG** Text formatting: Help

Identifier * parent

Homepage

Public ☒

ProjectCustomField

Trackers

☒ Bug ☒ Feature ☒ Support

Custom fields

☐ IssueCustomField

Save

Figure 2. Project settings screen

2.3.1 General settings

The following general settings are available:

- **Name:** project display name (must be unique). For FABRIC the name “FABRIC-IP” is selected.
- **Subproject of:** allows definition of a parent project to the project being created. Projects can be unlimitedly nested. This feature was used in FABRIC to create a subproject that features restricted access only for the FABRIC Core Group members. In this subproject, which has all the functionalities of a regular project, the minutes and presentations of the Core Group meetings and telephone conferences are stored.
- **Description:** High level description of the project that appears on the project overview.
- **Identifier:** used by the application for various things (eg. in URLs). It must be unique and cannot be composed of only numbers. Once the project is created, this identifier cannot be modified.
- **Homepage:** homepage-link that appears on the project overview.

- **Public:** if checked, the project can be viewed by all the users, including those who are not members of the project. If unchecked, only the project members have access to it, according to their role. Of course FABRIC-IP is accessed only by its authorized members.

If there are any projects custom fields configured by the administrator, they'll show up behind the "Public"-setting noted above.

2.3.1.1 Trackers

Redmine allows to define which of the configured trackers (thus also their respective workflows) are enabled for use within a specific project.

- **Trackers:** allows selection of the trackers to use for issues of the project. Only the administrator can define new trackers.

2.3.1.2 Custom fields

- **Custom fields:** allows selection of the issues custom fields to be used for issues of the project. Only the administrator can define new custom fields.

Note that some of these custom fields can be only configured (e.g. unchecked) if the issue custom field is *not* defined as a *global* issue custom field (which can be done by the administrator by checking the "For all projects" checkbox in the custom field create/edit view).

2.3.2 Modules

This screen lets the administrator choose the modules for use within the project.

Disabling a module does not delete the associated data. It only prevents users from accessing it. After a module was disabled, it can be re-enabled with all its data intact. As an example, the Wiki module can be disabled and users cannot access it but when it is re-enabled, all of the existing wiki entries will be available.

2.3.2.1 Core modules

- Issue tracking: provides Issue tracking feature, including issue categories, versions, the Roadmap and version overviews
- Time tracking: provides Time tracking feature
- News: provides News feature
- Documents: provides Documents feature
- Files: provides Files feature
- Wiki: provides Wiki feature
- Repository: provides Repository feature

- **Boards:** provides Forum feature
- **Calendar:** provides Calendar feature
- **Gantt:** provides Gantt feature

Additional modules can be added to the system using Redmine plugins. Plugins can only be installed by the administrator.

2.3.3 Members

This screen lets the administrator define project members and their roles. The administrator can add a user or a group, with one or multiple role(s) in a given project.

2.3.4 Versions

Projects versions allow the tracking and planning of changes. The administrator can assign issues to versions and then view the list of assigned issues for each version on the roadmap. The administrator can also assign a wiki page to a version which will be added to the roadmap and the version overview.

Note: the roadmap menu-item shows up in the project-menu only when the issue tracking module is enabled for the project and at least one version is configured in the projects settings.

The following properties are configurable for (each of the) versions:

- **Name:** The text to be displayed to identify the version. *This field is required.*
- **Description:** A short description to describe the version. *This field is optional.*
- **Status:** the status allows control of how issues can be assigned to the version:
 - open: no restriction (default)
 - locked: cannot assign new issues to the version
 - closed: cannot assign new issues and cannot reopen assigned issues
- **Wiki Page:** The name of a wiki page assigned to the version. *This field is optional.*
- **Date:** The due date for the version to be completed. *This field is optional.*
- **Sharing:** this option allows sharing of the version with other projects, so that issues from these other projects can be assigned to the shared versions. Each version can be shared with:
 - subprojects: all the descendant projects
 - projects in the project hierarchy: ancestors + descendants (needs versions management permission on the root project)
 - projects in the project tree: root project + all its descendants (same as above)
 - all projects (can be set by admin users only)

Sharing a version of a private project with public projects will make its name visible to everyone.

From the versions list, the administrator can click on **Close completed versions** to automatically set the status of all the completed versions (due date reached and no open issues) to *closed*.

2.3.5 Issue categories

Issue categories allow organization of issues. Categories can for example correspond to the different components of the project.

The administrator is able to configure your own set of issue categories for each individual project. It is also possible to auto-assign new issues to a specific user based on the chosen category of the newly created issues.

The following properties are configurable for (each of the) issue categories:

- **Name:** The text to be displayed to identify the issue category. *This field is required.*
- **Assigned to:** The project member to who newly created issues in this category will be assigned. *This field is optional.*

2.3.6 Calendar

2.3.6.1 Overview

The calendar provides an overview of the current project as a monthly view. This view displays all the issues that have at least a start date and indicates their start date and (if available) their due date. The calendar also displays all versions which have a due date set.

2.3.6.2 Access control

Module activation

The calendar module can be enabled or disabled per project via the project's configuration tab. Within the configuration page go to the Modules tab and check or uncheck the Calendar checkbox to activate or disable the module.

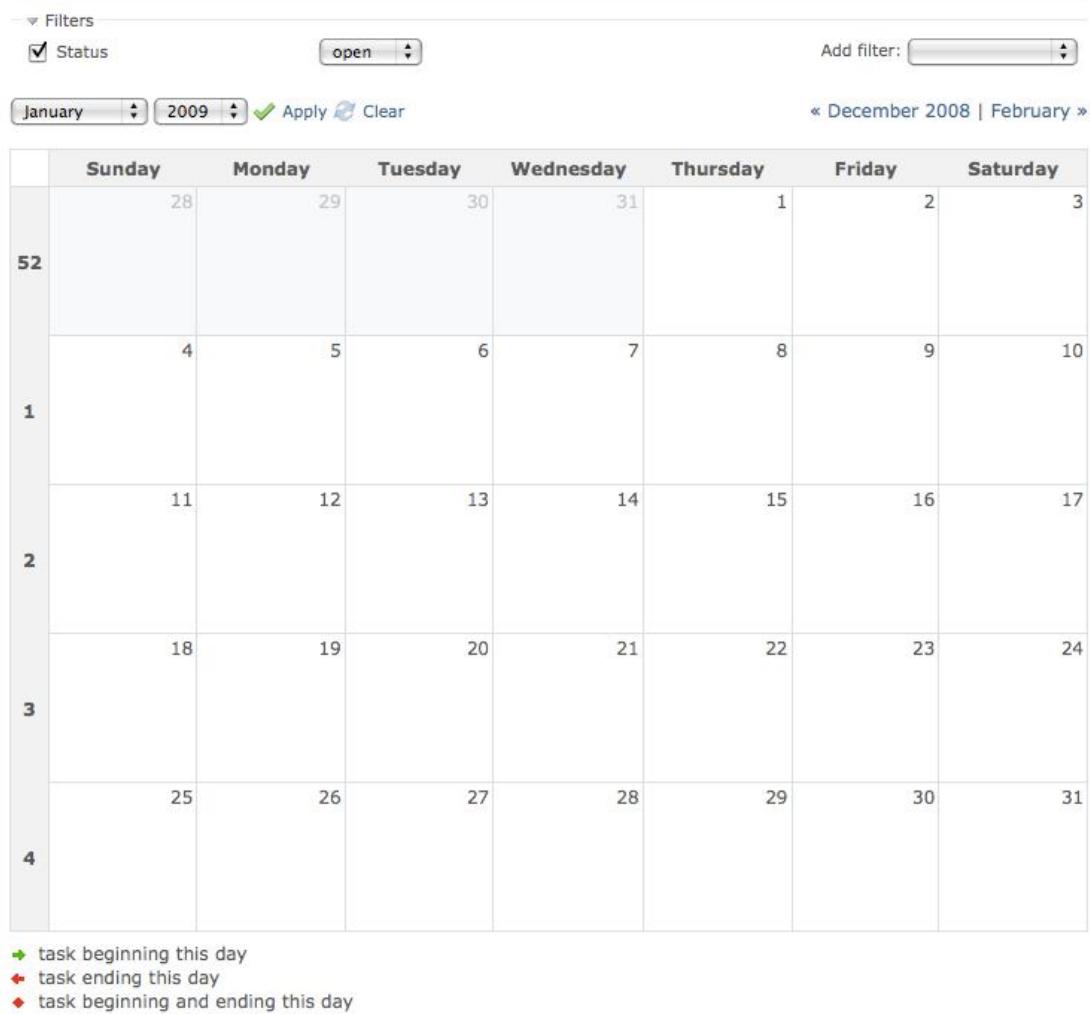
Roles and permissions

Access to the module can be granted or denied at a role level. To do this go to the administration page, follow the roles and permissions link, choose a role and check or uncheck the Calendar permissions checkbox.

Filters

Like on the issue-lists and the Gantt chart, it is possible to define filters to define a subset of issues to be shown on the calendar. Such filters are similar to those specified on any issue-list.

Calendar



Powered by Redmine © 2006-2010 Jean-Philippe Lang

Figure 3. REDMINE Calendar view

2.3.7 Wiki

Each project can have its own wiki. It can be enabled within the project settings page and selecting in the modules tab.

- **Start page:** This page is used as the start page for the wiki in both the project menu wiki link as well as in the start page link in the wiki sidebar (default: 'Wiki'). *This field is required.*

2.3.8 Repository

A SCM repository can be associated with each project. Once the repository is configured, the changesets can be browsed and viewed. The changesets also appear in the Activity view.

2.3.9 Forums

Each project can have one or more discussion forums. Each forum has the following properties:

- **Name:** The text to be displayed to identify the discussion forum. *This field is required.*
- **Description:** A short description to describe the subject of the specific forum. *This field is required.*

2.4 NEWS

In the news area authorized users can publish news items about the project.

The user has to provide the news item with a title, a summary and the detailed description. The summary will be displayed in the **Latest news** area of the project overview whereas the description will be displayed upon clicking on the title of the news item.

If the user has the permissions to create news items, then he/she can add/edit/delete an existing news entry (see Redmine Permissions).

If the user has the permission to create news items, they can see a green plus sign (+ **Add news**) in the upper right of their screen. By clicking on that, they can create a news item. On this page, they have to insert the **Title**, **Summary** and **Description** of the news item.

2.5 WIKIS

2.5.1 Creating a new wiki page

As in every wiki, the link to a new wiki page is created as follows.

```
[[MyNewWikiPage]]
```

Save the page and click on that link: a new wiki page with "MyNewWikiPage" as its name has been created.

2.5.2 Creating an additional wiki side bar

The content of the wiki page named 'Sidebar' is rendered in the wiki sidebar if it exists. Permission to protect wiki pages is required to create this page.

2.5.3 Creating sub-pages (parent/child relationships)

It is possible to create parent/child relationships between wiki-pages. This has two benefits:

- On the "Index by title", the page tree is sorted according to the relationships:
- *Guide*


- *RedmineAccounts*
 - *RedmineCustomFields*
 - *RedmineInstall*
 - *RedmineIssueList*
 - *RedmineIssues*
- On each child page a breadcrumb is displayed showing the location of the page within the page tree.

These relations can be set by assigning a parent page to a to-be child-page. This assignment can be done via the rename dialog only. Thus, create both the child- and parent-pages and then open the to-be child-page and click "rename", then select the name of the parent page and click "save".


2.5.4 Protecting a wiki page

If you have the permission to protect wiki pages, you can click on  **Lock**.

A locked wiki page can only be edited by users who have the permission to protect wiki pages.

It can be unlocked by those users by clicking  **Unlock**.

2.5.5 Wiki page history

Redmine keeps a record of every change made to a wiki page. The list of these changes can be viewed by clicking on  **History**.

Overview

History

#	Updated	Author	Comment	
41	2009-11-05 13:15	Jean-Philippe Lang		Annotate
40	2009-11-04 13:12	Jean-Philippe Lang	link to Donors page	Annotate
39	2009-10-11 18:35	Eric Davis	Fixed and updated the demo site	Annotate
38	2009-10-11 10:55	Jean-Philippe Lang	Demo url	Annotate
37	2009-06-16 02:59	Mische The Evil	Added back-in a modified demo-section	Annotate
36	2009-04-29 13:35	Thomas Lecavelier	typo	Annotate

To view a specific version of the page click on its number.

« Previous - Version 31/41 (diff) - Next » - Current version
 Jean-Philippe Lang, 2009-01-02 20:13
 link to old forums removed

 Watch  Unlock  Delete  Rollback to this version  History

Redmine

Redmine is a flexible project management web application. Written using Ruby on Rails framework, it is cross-platform and cross-database.


Redmine is open source and released under the terms of the  GNU General Public License v2 (GPL).

Overview

- Multiple projects support
- Flexible role based access control

What is displayed can be misleading: Version 31/41 (diff) means that you are viewing version 31 out of 41, it does not mean that the diff link will show you the differences between 31 and 41. It does show you the differences between version 30 and 31. If you're looking at version 30, you'll see Version 30/41, and the diff will show you the changes in version 30.

If you want to see differences between 40 and 41, go to the revisions list and click 'View changes' (by default, it will show the diff of the last version).

You can revert a page to a previous version by clicking on  **Rollback to this version**, then **Save**. In that case a new page version is created without losing the wiki page history.

If you instead do want to delete all history of a wiki page you have to copy the content of that page to a save place (copy/paste in edit window), delete the page and re-create it with the same name. Then re-insert the copied content.

2.5.6 Sidebar

The contextual sidebar on the right of any wiki page provides links to:

- **Start page:** Link to the configured start page of the wiki
- **Index by title:** Index of all the wiki pages sorted by name (and, if configured, by parent/child relationships)
- **Index by date:** Index of all the wiki pages sorted by date of last modification

2.6 REDMINE SEARCH

A part of any project management process is spent looking for existing information. Enter the Redmine search capability.

Search box

At the top right-hand side of Redmine is a simple search box. Type anything and press enter to search.

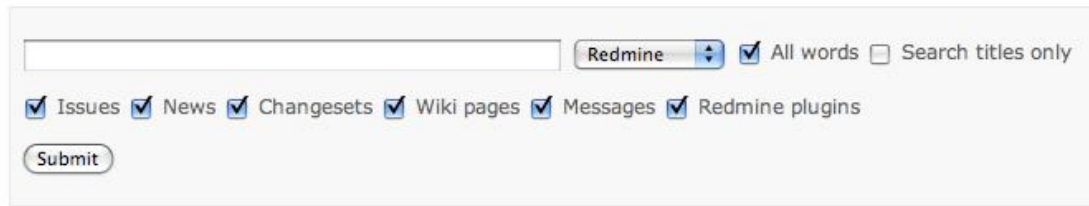
Searching for `#{IssueID}` or `{IssueID}` will go straight to the issue. Search parameters can be enclosed in double quotation marks.

A screenshot of the Redmine search box. It consists of a blue rectangular button with the word "Search:" in white text on the left, followed by a white rectangular input field.

Depending on permission settings and project membership a drop down menu option may show the current project. Simple search searches full text on the project currently displayed in that selection pane.

Clicking on the word **Search** leads to the advanced search and results page. The project selection pane is updated, and there are checkboxes to limit search to specific types of entries. The checkboxes are displayed only if the module is enabled at that project level.

Search



A screenshot of the Redmine search interface. It features a search input field, a dropdown menu set to 'Redmine', and several checkboxes for search scope and content types. The 'All words' checkbox is checked, while 'Search titles only' is unchecked. Below these, checkboxes for 'Issues', 'News', 'Changesets', 'Wiki pages', 'Messages', and 'Redmine plugins' are all checked. A 'Submit' button is located at the bottom left of the search area.

Redmine ☒ All words ☐ Search titles only

☒ Issues ☒ News ☒ Changesets ☒ Wiki pages ☒ Messages ☒ Redmine plugins

Figure 4. Redmine search

3 FABRIC ONLINE COLLABORATION PLATFORM SERVICES

3.1 RESTRICTED ACCESS

3.1.1 URL

The FABRIC Online Collaboration Platform can be accessed at the following address:

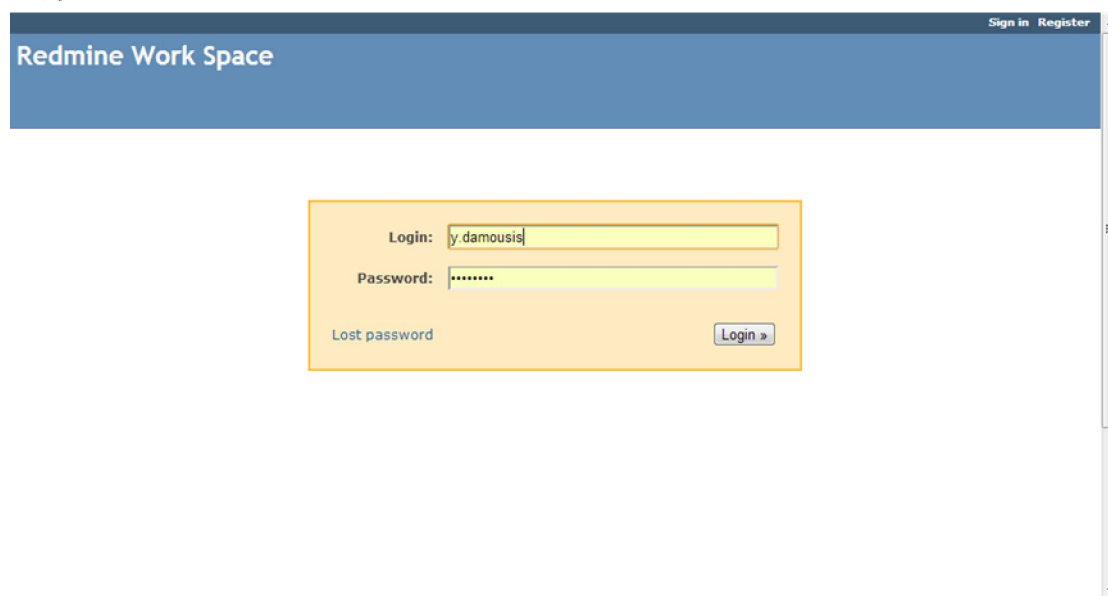
<http://redmine.fabric-project.eu>

3.1.2 Login

The **Sign in** page is used to login into FABRIC. Only members **who have been authorized by the OCP administrator** have login credentials to access the FABRIC platform. The **Lost password** link is only displayed if the administrator has activated it.

At the moment of writing, there are 84 authorized FABRIC members. Their complete contact information is listed in Annex II (only available in restricted version of the Deliverable).

Webpage Screenshot



http://redmine.fabricproject.eu/login?back_url=http%3A%2F%2Fredmine.fabricproject.eu%2F Thu Jan 16 2014 10:52:26 GMT+0200 (GTB Standard Time)

Figure 5. Redmine Login page

3.2 PROJECT OVERVIEW

After a successful login the project member enters the project area. The initial screen is the Project overview.

In the **Overview** area there is a high level description of the project and the project's website address.

In the **Members** area one can see who are the members of FABRIC and in particular who are the administrators of the collaboration platform. In the **Latest news** area the member can see which the latest news for FABRIC.

Webpage Screenshot

Home My page Projects Administration Help

Logged in as y.damousis My account Sign out

FABRIC-IP

Search: FABRIC-IP

Overview Activity Calendar News DMSF Wiki Settings

Overview

FABRIC addresses directly the technological feasibility, economic viability and socio-environmental of dynamic on-road charging of electric vehicles.

FABRIC responds to the need to assess the potential and feasibility of a more extensive integration of electric vehicles in the mobility and transportation system, focusing primarily on dynamic wireless charging which would allow practically all of the drawbacks of on-board battery packs to be avoided. On-road charging would also enable the direct link to renewable energy sources: Ultimately this is the only way to fully decarbonise road transport and hence provide true sustainability from the socio-environmental perspective.

Specifically, by engaging a highly-qualified, expert and comprehensive group of key stakeholders within its consortium, FABRIC will determine and assess the end-user requirements that will determine the potential of success in various application sectors, the technology drivers and challenges that impact the widespread implementation of wireless charging technology, and the technology gaps to be bridged in order to provide rational and cost-effective solutions for the grid and road infrastructures.

Advanced solutions, conceived to enable full integration in the grid and road infrastructure within urban- and extra-urban environments for a wide range of future electric vehicles, will be implemented and tested. Each key issue will be assessed directly and comprehensively, providing insights through experimental evaluations into the relevant technologies, investigating the present and future opportunities for such solutions, and identifying the future trends and requirements for research and development. The ultimate aim is to provide a pivotal contribution to the evolution of e-Mobility in Europe by identifying the benefits and costs in absolute terms so that the investments required in the coming years for widespread implementation and exploitation can be fully defined and quantified.

- Homepage: www.fabric-project.eu
- Subprojects: FABRIC CORE GROUP

Members

Manager: Brousta, Evi, Damousis, Yannis, Portouli, Bettina, Villy, Portouli
 Developer: Brousta, Evi, Portouli, Bettina, Villy, Portouli
 Reporter: ALESSANDRA, BUGAUDI, ALESSANDRO, DEGLORIA, ALEXIA, JOURNE, ALMIE, VANASTEN, Amditis, Angelos, ANDREA, TONOLI, ANDREW, WINDER, ANITA, TONI, AXEL, BARKOW, BORIS, BERSENEFF, Brousta, Evi, CATERINA, RITTA, CEDRIC, NOUILLANT, Damousis, Yannis, DANIEL, ROIU, DANIELA, PARENA, DAVID, QUESADA, DENIS, NABEREZHNYKH, DESPOINA, KANETI, ELENA, MIRETTI, ELISA, MINCHIANTO, EMILIANO, ROGGERO, EMMA, BENBOW, EZIO, SPESSA, FABIEN, MARQUIS, FABRIZIO, BORRA, FABRIZIO, DUGHIERO, FEDERICO, BONICASTAGNETTI, FRANCESCO, BELLOTTI, FRANCO, RONCAGLIONE, GABRIELE, VELENICH, GERARD, COQUERY, GIAMPIERO, BRUSAGLINO, GIANLUCA, FORNERON, GIUSEPPE, MIRETTI, GUY, FREMONT, HAKAN, GUSTAVSSON, HANS, BLUDSZUWEIT, HASNAA, ANISS, JACQUES, ECRABEY, JAVIER, MEDINA, JEAN-CHARLES, PANDAZIS, JENS, MERTEN, JEROME, PERRIN, JESUS, SALLAN, JOEL, FRANKLIN, JOSE, FERNANDEZ, JOSE, SANZ, JUAN LUIS, VILLA, JUAN, DE BLAS, Karaseitanidis, Giannis, LEONARDO, SUBIAS, LUCA, BELLINO, LUCA, ZANOTTI FRAGONARA, LUISA, ANDREONE, MARIAPAOLA, BIANCONI, MASSIMILIANO, CURTO, MEHMET, EMRE, NICOLA, AMATI, NICOLE, KRINGOS, OLIVIER, CAYOL, PANAGIOTIS, PAPADIMITRATOS, PAOLO, GUGLIELMI, PAOLO, MARTINOTTI, PATRIZIA, MANTOVANI, Portouli, Bettina, RAVELLO, VITTORIO, RENATO, MULINACCI, RICHARD, LODGE, RICHARD, SEBESTYEN, RICHARD, WALKER, ROBERTA, REGGIANI, ROSARIO, CERAVOLO, ROY, JOHANSSON, SARA, OLIVERA, SARA, PASTORINO, SEBASTIAAN, MEIJER, SHAINOOR, NOORALI, STEFANO, PERSI, STEVEN, WILKINS, THEODOROS, THEODOROPoulos, ULF, CEDER, VALERIA, CANTELLO, Villy, Portouli, VINCENZO, CIRIMELE

Latest news

FABRIC Kick-off Meeting
 Added by Damousis, Yannis about 19 hours ago

[View all news](#)

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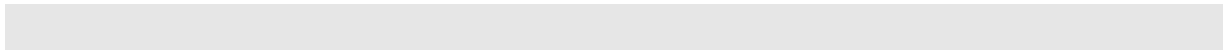
<http://redmine.fabric-project.eu/projects/fabric-ip> Fri Feb 07 2014 12:12:49 GMT+0200 (GTE Standard Time)

Figure 6. Initial screen after successful login to the FABRIC OCP

In addition there is a link to the subproject that is restricted to Core Group members ("Subproject: FABRIC CORE GROUP"). The following partners comprise the FABRIC's Core Group:

- ICCS (project coordinator and SP4 Leader)
- ERT (SP2 Leader)
- TRL (SP3 Leader)
- KTH (SP5 Leader)
- CRF

Specific persons from these partners are Core Group members and these are the only ones that can access the subproject. The names of these members are listed in Annex II. FABRIC emailing lists (available only in the restricted version of the Deliverable).



3.3 DOCUMENT MANAGEMENT SYSTEM FEATURES (DMSF) [6]

DMSF is Document Management System Features plugin and it replaces the Redmine's Documents module.

Initial development was for Kontron AG R&D department and it was released at the beginning of May 2011 as open source to further maintain it by community.

The latest source codes and all related data are maintained on GitHub


Features

- Directory structure
- Document versioning/revision history
- Email notifications for directories/documents
- Document locking
- Multi drag&drop uploads
- Multi download via Zip
- Direct email document sending
- Simple document approval workflow
- Document access auditing
- Provide Redmine activity feed
- Wiki macro for content linking
- Optional document content fulltext search
- WebDAV access

3.3.1 File browsing and accessing

The online collaboration platform at the moment of writing functions primarily as an online file repository. Partners are able to access documents and also upload their own. In that way all partners have access to the same files and the latest versions of the documents.

The file system structure in Redmine is similar to the one existing in desktop operating systems. The management of the files is also intuitive and there is also help for the available options when the mouse hovers over a button.

The symbol  is used to denote selection (clicking with the mouse).

When the user selects DMSF, a screen with several folders appears. The folder structure follows the structure of the project. In that way there is a folder for each FABRIC SubProject and two additional folders, one for administrative and financial issues and another for the project meetings.

Webpage Screenshot

Home My page Projects Administration Help

Logged in as y.damouzis My account Sign out





























FABRIC-IP

Search: FABRIC-IP

Overview Activity Calendar News **FABRIC-IP** Settings

Documents

Download Email Filter:

	Title	Size	Modified	Ver.	Author	
<input type="checkbox"/>	Administrative	[10] 14.3 MB	01/09/2014 03:01 pm		Portouli	   
<input type="checkbox"/>	General Assembly meetings	[2] 79.5 KB	01/09/2014 02:57 pm		Portouli	   
<input type="checkbox"/>	SP1 Management	[0] 0 Bytes	01/09/2014 03:00 pm		Bettina	   
<input type="checkbox"/>	SP2 ICT Solutions	[0] 0 Bytes	01/09/2014 03:01 pm		Bettina	   
<input type="checkbox"/>	SP3 Charging Solutions	[0] 0 Bytes	01/09/2014 03:00 pm		Bettina	   
<input type="checkbox"/>	SP4 Integration, Infrastructure and Testing	[0] 0 Bytes	01/09/2014 03:00 pm		Bettina	   
<input type="checkbox"/>	SP5 Assessment	[0] 0 Bytes	01/09/2014 03:01 pm		Bettina	   

Folders: 7, Documents: 0

Upload

Select files
Add files to the upload queue and click the start button.

Filename	Status	Size
Drag files here.		

0% 0 kb

Powered by Redmine © 2006-2013 Jean-Philippe Lang

<http://redmine.fabric-project.eu/projects/fabric-ip/dms/> Thu Jan 16 2014 10:10:07 GMT+0200 (GTB Standard Time)**Figure 7. FABRIC online file management system**

By selecting a folder the user can view its contents. Below is the example of selecting the Administrative folder.

Webpage Screenshot

Home My page Projects Administration Help Logged in as y.damouais My account Sign out

















FABRIC-IP

Search: FABRIC-IP

Overview Activity Calendar News **DMSF** Settings

Documents / Administrative

Download Email Delete Filter:

	Title	Size	Modified	Ver.	Author	
<input type="checkbox"/>	Budget in Force	[1] 895 KB	01/09/2014 09:23 am		Portouli	   
<input type="checkbox"/>	Consortium Agreement	[1] 7.39 MB	01/08/2014 03:01 pm		Portouli	   
<input type="checkbox"/>	DoW	[1] 4.57 MB	01/08/2014 03:01 pm		Portouli	   
<input type="checkbox"/>	Grant Agreement	[7] 1.44 MB	01/08/2014 03:00 pm		Portouli	   

Folders: 4, Documents: 0

Upload

Select files
Add files to the upload queue and click the start button.

Filename	Status	Size
Drag files here.		

0% 0 kb

Powered by Redmine © 2006-2013 Jean-Philippe Lang

http://redmine.fabric-project.eu/projects/fabric-ip/dmsf/folder_id=144 Thu Jan 16 2014 10:10:43 GMT+0200 (CET Standard Time)
Webpage Screenshot

Home My page Projects Administration Help Logged in as y.damouais My account Sign out





























FABRIC-IP

Search: FABRIC-IP

Overview Activity Calendar News **DMSF** Settings

Documents / Administrative / Grant Agreement

Download Email Delete Filter:

	Title	Size	Modified	Ver.	Author	
<input type="checkbox"/>	FABRIC Signed Grant Agreement FABRIC_Signed_Grant Agreement.pdf	874 KB	01/13/2014 02:32 pm	0.1	Portouli	   
<input type="checkbox"/>	fp7-ga-annex2 v7 en fp7-ga-annex2-v7_en.pdf	202 KB	01/08/2014 03:02 pm	0.1	Portouli	   
<input type="checkbox"/>	fp7-ga-annex4-v2 en fp7-ga-annex4-v2_en.pdf	9.39 KB	01/08/2014 03:02 pm	0.1	Portouli	   
<input type="checkbox"/>	fp7-ga-annex5-v2 en fp7-ga-annex5-v2_en.pdf	15.1 KB	01/08/2014 03:02 pm	0.1	Portouli	   
<input type="checkbox"/>	fp7-ga-annex6-cp-v3 en fp7-ga-annex6-cp-v3_en.pdf	22.1 KB	01/08/2014 03:02 pm	0.1	Portouli	   
<input type="checkbox"/>	fp7-ga-annex7d-v4 en fp7-ga-annex7d-v4_en.pdf	292 KB	01/08/2014 03:02 pm	0.1	Portouli	   
<input type="checkbox"/>	fp7-ga-annex7e-v4 en fp7-ga-annex7e-v4_en.pdf	60.8 KB	01/08/2014 03:02 pm	0.1	Portouli	   

Folders: 0, Documents: 7

Upload

Select files
Add files to the upload queue and click the start button.

Filename	Status	Size
Drag files here.		

0% 0 kb

Powered by Redmine © 2006-2013 Jean-Philippe Lang

http://redmine.fabric-project.eu/projects/fabric-ip/dmsf/folder_id=145 Thu Jan 16 2014 10:11:19 GMT+0200 (CET Standard Time)

Figure 8. Folder navigation

3.3.2 File management

The process can be repeated until the user reaches a specific file. Then the file can be downloaded to the user's desktop computer.

Several other file management options are available:



Figure 9. FABRIC OCP file management options



File information

Lock file or folder to prevent changes for other members

Delete file or folder

Notifications for file or folder active/not active

3.3.3 File upload

The uploading of files by authorized users (all FABRIC members) is straight forward and several files can be dragged and dropped in the corresponding field or be selected from the desktop computer in the conventional way using the operating system's file selection dialog box. After the file is uploaded the user can enter a description for the file, comments and also version number.

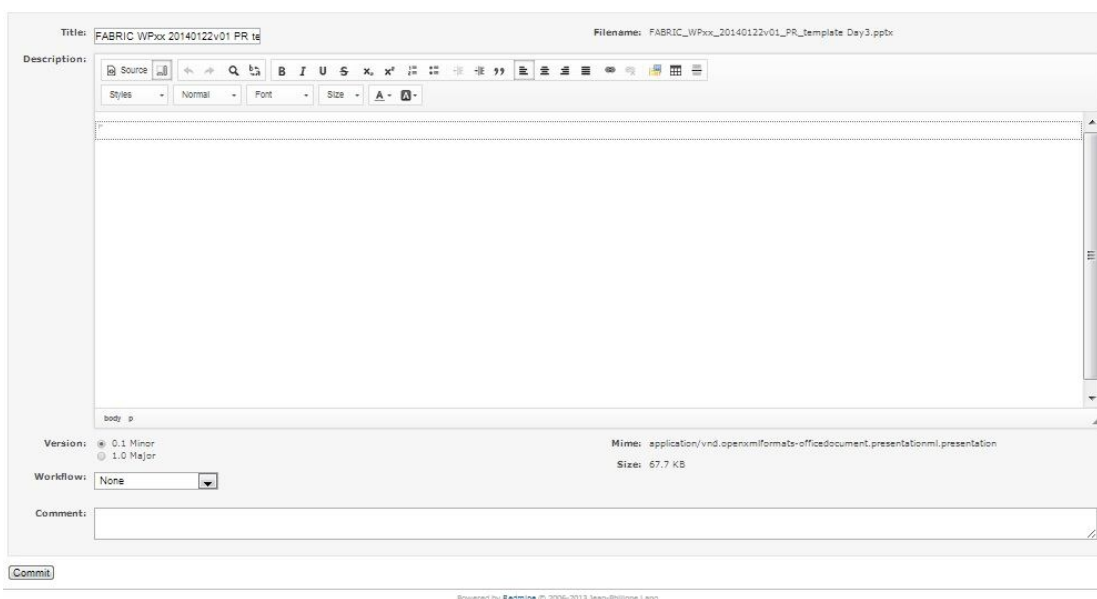


Figure 10. File commitment screen

3.3.4 SP file structure

The folder structure corresponds to the structure found in the Description of Work regarding the SPs , WPs and tasks.

Webpage Screenshot

Home My page Projects Administration Help Logged in as y.damoussis My account Sign out

FABRIC-IP Search: FABRIC-IP

Overview Activity Calendar News **DMSF** Settings

Documents

Download Email Filter:

Title	Size	Modified	Ver.	Author
Administrative	[10] 14.3 MB	01/09/2014 03:01 pm		Portouli
General Assembly meetings	[2] 79.5 KB	01/09/2014 02:57 pm		Portouli
SP1 Management	[0] 0 Bytes	01/09/2014 03:00 pm		Bettina
SP2 ICT Solutions	[0] 0 Bytes	01/09/2014 03:01 pm		Bettina
SP3 Charging Solutions	[0] 0 Bytes	01/09/2014 03:00 pm		Bettina
SP4 Integration, Infrastructure and Testing	[0] 0 Bytes	01/09/2014 03:00 pm		Bettina
SP5 Assessment	[0] 0 Bytes	01/09/2014 03:01 pm		Bettina

Folders: 7, Documents: 0

Upload

Select files
Add files to the upload queue and click the start button.

Filename	Status	Size
Drag files here.		

Add Files Start Upload 0% 0 kb

Powered by Redmine © 2006-2013 Jean-Philippe Lang
http://redmine.fabric-project.eu/projects/fabric-ip/dmsf?folder_id=6 Thu Jan 16 2014 10:10:07 GMT+0200 (GTB Standard Time)

Webpage Screenshot

Home My page Projects Administration Help Logged in as y.damoussis My account Sign out

FABRIC-IP Search: FABRIC-IP

Overview Activity Calendar News **DMSF** Settings

Documents / SP3 Charging Solutions

Download Email Delete Filter:

Title	Size	Modified	Ver.	Author
SP3 meetings	[0] 0 Bytes	01/09/2014 02:59 pm		Portouli
WP 3.1 SP TECHNICAL COORDINATION MANAGEMENT	[0] 0 Bytes	09/27/2013 04:18 pm		Bettina
WP 3.2 USER NEEDS AND REQUIREMENTS	[0] 0 Bytes	09/27/2013 04:19 pm		Bettina
WP 3.3 TECHNICAL BENCHMARKING	[0] 0 Bytes	09/27/2013 04:20 pm		Bettina
WP 3.4 SPECIFICATIONS	[0] 0 Bytes	09/27/2013 04:20 pm		Bettina
WP 3.5 DEFINE ARCHITECTURE	[0] 0 Bytes	09/27/2013 04:21 pm		Bettina
WP 3.6 DESIGN	[0] 0 Bytes	09/27/2013 04:21 pm		Bettina
WP 3.7 VERIFICATION	[0] 0 Bytes	09/27/2013 04:22 pm		Bettina

Folders: 8, Documents: 0

Upload

Select files
Add files to the upload queue and click the start button.

Filename	Status	Size
Drag files here.		

Add Files Start Upload 0% 0 kb

Powered by Redmine © 2006-2013 Jean-Philippe Lang
http://redmine.fabric-project.eu/projects/fabric-ip/dmsf?folder_id=6 Thu Jan 16 2014 11:04:22 GMT+0200 (GTB Standard Time)

Figure 11. FABRIC DMSF folder structure

3.4 FABRIC WIKI

The Wiki is an ongoing process. It will be updated throughout the progress of the project. Currently it has the following contents.

General Information

- How to begin (link to Redmine help for first-time users)
- Deliverable list (as listed in the Description of Work)
- Reviewers (deliverables peer reviewers as defined in the FABRIC process handbook)
- Glossary (Terminology related to EV and electro-mobility, see Annex I.)

Mailing lists

- Partners' full contact list (see Annex II. in restricted version of the Del.)
- Project Core Group
- SP and WP Leaders
- Administration list
- External Reference Group

Help

- DMSF - document management system
- Change or reset account password

SP related pages

- Contents to be determined during the project.

One important change implemented to FABRIC wiki is the inclusion of an HTML-based WYSIWYG editor. In that way the creation and editing of wiki and other pages in the OCP is not done using the TEXTILE [7] mark-up language which is not practical for editing large documents that include tables and rich format features. Using the HTML-based editor it is possible to copy large documents and tables from desktop office applications such as MS Word or Excel and keep the formatting mostly intact.

All FABRIC members have the right to create or modify wiki pages.

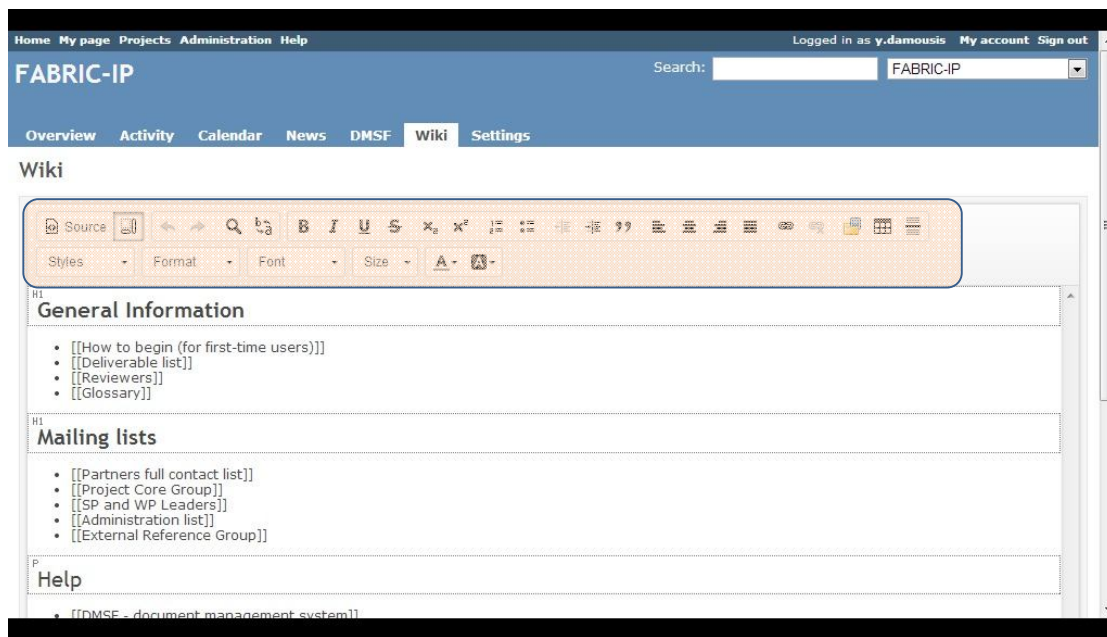


Figure 12. FABRIC OCP HTML-based WYSIWYG page editor

4. CONCLUSIONS

In this document the main functionalities of the FABRIC Online Collaboration Platform are described. The platform, which is based on the free to use project management platform Redmine, is functional from the beginning of the project. More than 84 FABRIC members have been registered and at the moment of writing have access to the platform. The platform is currently used mainly as a file repository. All partners have access to the same files and the latest versions of documents making collaboration efficient. The platform will be updated continuously during the project:

- Deliverables, milestones and internal reports will be uploaded.
- Presentations and minutes from physical minutes and telephone conferences will be available.
- Administrative documents, the description of work, the consortium agreement and financial data will be stored.

In addition to the file management system, the platform allows the use of more advanced features for project monitoring and planning, such as GANTT charts, calendar and issue trackers that allow the monitoring of work in specific tasks. Communication tools such as forums are also available in case the email communication is not effective. These features will be utilized during the project if needed.

Currently there is a Wiki structure in the platform. It contains pages to help partners use the system, a glossary of terms related to EV and electro-mobility, the contact information of everyone involved in FABRIC, e-mailing lists and information from the Description of Work and the project's process handbook (quality manual).

The news section of the platform allows for the broadcasting of relevant to the project news. The whole platform will be updated continuously as more content from FABRIC research and development becomes available.

REFERENCES

- [1] The GNU Operating System: www.gnu.org/
- [2] Redmine: www.redmine.org/
- [3] The Trac project: trac.edgewall.org/
- [4] Ruby on rails: rubyonrails.org/
- [5] Bitnami: bitnami.com/
- [6] DMSF: www.redmine.org/plugins/dmsf
- [7] TEXTILE markup language: [en.wikipedia.org/wiki/Textile_\(markup_language\)](http://en.wikipedia.org/wiki/Textile_(markup_language))

ANNEX

I. WIKI Glossary of terms

Term	Meaning
Alternating Current (AC)	An electric current that reverses direction at regular intervals. Electric car motors are either AC or DC (see below), with most of the new breed being of AC type.
Alternate Fuel Vehicle (AFV)	A vehicle powered by fuel other than gasoline or diesel. Examples of alternative fuels are electricity, hydrogen, and CNG.
Ampere (A)	The ampere is that constant current which, if maintained in two straight parallel conductors of infinite length, of negligible circular cross-section, and placed 1 metre apart in vacuum, would produce between these conductors a force equal to 2×10^{-7} Newton per meter of length. The ampere unit is symbolized by "A".
Ampere-hour capacity	The quantity of electric charge measured in ampere-hours (Ah) that may be delivered by a cell or battery under specified conditions. One ampere-hour is the electric charge transferred by a steady current of one ampere for one hour. In EV applications, typical conditions involve a specific ambient temperature and a discharge time of 1 or 3 hours: in these cases the capacity is expressed as C1 or C3 (see also "Rated capacity", "Installed capacity", "Energy capacity").
Ampere-hour efficiency	The ratio of the output of a secondary cell or battery, measured in ampere-hours, to the input required to restore the initial state of charge, under specified conditions (also coulombic efficiency). It is not dependent on the change of voltage during charge and discharge. The ratio of the output of a secondary cell or battery, measured in ampere-hours, to the input required to restore the initial state of charge, under specified conditions (also coulombic efficiency). It is not dependent on the change of voltage during charge and discharge.
Battery cell	A primary cell delivers electric current as the result of an electrochemical reaction that is not efficiently reversible, so the cell cannot be recharged efficiently. A secondary cell is an electrolytic cell for generating electric energy, in which the cell, after being discharged, may be restored to a charged condition by sending a current through it in the direction opposite to that of the discharging current.
Battery module	A group of interconnected electrochemical cells in a series and/or parallel arrangement, physically contained in an enclosure as a single unit, constituting a direct-current voltage source used to store electrical energy as chemical energy (charge) and to later convert chemical energy directly into electric energy (discharge). Electrochemical cells are electrically interconnected in an appropriate series/parallel arrangement to provide the module's required operating voltage and current levels. In common usage, the term "battery" is often also applied to a single cell. However, use of "battery cell" is recommended when discussing a single cell.
Battery pack	A completely functional system that includes battery modules, battery support systems, and battery-specific controls. It may also be a combination of one or more battery modules, possibly with an added cooling system, and very likely with an added control system. A battery pack is the final assembly used to store and discharge

	electrical energy in a HEV, PHEV, or EV.
Battery round-trip efficiency	The ratio of the electrical output of a secondary cell, battery module, or battery pack on discharge to the electrical input required to restore it to the initial state of charge under specified conditions.
Battery State Of Charge (SOC)	The available capacity in a battery expressed as a percentage of rated nominal capacity.
Battery	An electricity storage medium that feeds electric current to the motor. Older EVs used lead acid or NiMH batteries, but modern electric car batteries are of lithium ion construction (see below).
Battery Electric Vehicle (BEV)	See EV below, An electric vehicle whose electricity is exclusively stored in batteries rather than a fuel cell or generator.
Brake Horsepower (BHP)	The actual power output of an engine or motor before any natural losses in power through components such as a gearbox and other ancillaries.
Battery Management System (BMS)	Mini onboard computer to monitor entire battery system and each individual battery. Also may be built into charging system.
C rate	<p>Discharge or charge current, in amperes, expressed in multiples of the rated capacity. For example, the C5/20 discharge current for a battery rated at the 5-h discharge rate is derived as follows:</p> <p>C5 (in Ah) divided by 20 gives the current (in A). As a cell's capacity is not the same at all discharge rates and usually increases with decreasing rate, a cell which discharges at the C5/20 rate will run longer than 20 h.</p>
Capacitance ©	<p>The ratio of the charge on one of the conductors of a capacitor (there being an equal and opposite charge on the other conductor) to the potential difference between the conductors.</p> <p>Capacitance is symbolized by "C".</p>
Capacitor	A device which consists essentially of two conductors (such as parallel metal plates) insulated from each other by a dielectric (an insulator that may be polarized by an applied electric field). As part of an electric circuit, a capacitor introduces the capability of storing electrical energy, blocks the flow of direct current, and permits the flow of alternating current to a degree dependent on the capacitor's capacitance and the current frequency.
Certification fuel economy or fuel consumption	An estimate of fuel economy (or the inverse, consumption) developed for official purposes by means of specified test procedures including particular driving cycles. These estimates usually result in fuel economy values that exceed what consumers actually realize in everyday use. Fuel economy and fuel consumption may for example be expressed in l/100km (liters per 100 km), km/l, or mpg (miles per gallon).
Charge Circuit Interrupting Device (CCID)	A safety device that will disable utility power to an EV charger in the event of a loss of isolation is detected.
Charging	The conversion of electrical energy, provided in the form of current from an external source, into chemical energy within a cell or battery. The (electrical) charge is also a basic property of elementary particles of matter.

Charge / charging factor	The factor by which the amount of electricity delivered during discharge is multiplied to determine the minimum amount required by the battery to recover its fully charged state. Normally, it is higher than 1.0 for most batteries in order to account for the losses in discharging and charging processes.
Charge rate	The current at which a battery is charged (see C rate).
Charger	An energy converter for the electrical charging of a battery consisting of galvanic secondary elements.
Charge depletion (CD)	When a rechargeable electric energy storage system (RESS) on a PHEV, EV or extended-range EV is discharged.
Charge depletion in blended mode (CDB)	When a rechargeable electric energy storage system (RESS) on a PHEV or extended-range EV is discharged, but it is not the only power source moving the vehicle forward (blended mode). A separate fuel and energy conversion system works in tandem with the RESS to provide power and energy to move the vehicle as charge of the RESS is depleted. This mode of operation allows use of a much less powerful RESS than does CDE operation.
Charge depletion all electrically (CDE)	When a rechargeable electric energy storage system (RESS) on a PHEV, EV or extended-range EV is discharged, and continuously provides the only means of moving the vehicle forward (all electric operation).
Charging equalizer	Device that equalizes the battery state of charge of all the modules in an EV during charging. Employing this measure ensures that the voltage of all the batteries will rise equally and that the battery with the smallest capacity is not overcharged.
Charging Point	A location where electric vehicles can be plugged in and charged. These can be at home, at work or in publicly accessible locations.
Controller	An element that restricts the flow of electric power to or from an electric motor or battery pack (module, cell). One purpose is for controlling torque and/or power output. Another may be maintenance of battery life, and/or temperature control.
Controller, Three-phase	An electronic circuit for controlling the output frequency and power from a 3-phase inverter.
Conventional mechanical drivetrain	A mechanical system between the vehicle energy source and the road including engine, transmission, driveshaft, differential, axle shafts, final gearing and wheels. The engine is operated by internal combustion (ICE).
Current	The rate of transfer of electricity, meaning the amount of electric charge passing a point per unit time. The unit of measure is the ampere, which represents around 6.241×10^{18} electrons passing a given point each second.
Cut-off voltage	The cell or battery voltage at which the discharge is terminated. The cut-off voltage is specified by the cell manufacturer and is generally intended to limit the discharge rate.
Cycle	A sequence of a discharge followed by a charge, or alternatively a charge followed by a discharge, of a battery under specified conditions.
Cycle life	The number of cycles under specified conditions that are available from a secondary battery before it fails to meet specified criteria regarding performance.
Direct Current (DC)	An electric current of constant direction. Electric car motors are either DC or AC, with DC motors generally being less expensive to buy and simpler to use on an

	electric car.
Discharge	The direct conversion of the chemical energy of a cell or battery into electrical energy and withdrawal of the electrical energy into a load.
Discharge rate	The rate, usually expressed in amperes, at which electrical current is taken from a battery cell, module, or pack (see "C rate").
Depth of Discharge (DOD)	A measure of how much energy has been withdrawn from a battery. It is expressed as a percentage of the total battery capacity. For example - if you use 25ah of a 100ah battery, that is running the battery to 25% DOD.
Ebike	Electric powered Bike, Cycle, Scooter
Electric drive system	The electric equipment that serves to drive the vehicle. This includes (a) driving motor(s), final control element(s), and controllers and software (control strategy).
Electric drivetrain (including electric drive system)	The electromechanical system between the vehicle energy source and the road. It includes controllers, motors, transmission, driveshaft, differential, axle shafts, final gearing, and wheels.
Electrochemical cell	The basic unit able to convert chemical energy directly into electric energy.
Electric Light Vehicle (ELV)	Encompasses Electric Vehicles, powered by battery and motor combination, weighing less than 500 pounds; e.g. e-bike, e-scooter, e-moped, e-motorcycle, e-ATV, golf cart e-velomobile (3wheels)
Energy capacity	The total number of watt-hours that can be withdrawn from a new cell or battery. The energy capacity of a given cell varies with temperature, rate, age, and cut-off voltage. This term is more common to system engineers than the battery industry, where the ampere-hour is the preferred unit and terminology.
Energy density	The ratio of energy available from a cell or battery to its volume in liters (Wh/L). The mass energy density in battery and EV industry is normally called specific energy.
Equalizing charge	An extended charge to ensure complete charging of all the cells in a battery.
Eroute	Route that an electric vehicle will travel. Intercity public/private transportation route with recharge station/stop. Note that an E-route may additionally denote a nominally "safe" street or paved thoroughfare. It may optionally be marked with easily seen and high-visibility signage.
Etaxi	Electric powered Taxi/Tricycle
Electric Vehicle Consultant (EVC)	– A good EVC knows all aspects of obtaining, sizing, delivery, training and roll out of private (single) and public (mass) Motorcycle and EV transportation systems. Including infrastructure and route (Eroute) planning.
EVD	Electric Vehicle Driver
Electric Vehicle Supply Equipment (EVSE)	The charging equipment used to obtain a charge for an EV or BEV battery system.
Electric Vehicle (EV)	Any vehicle that uses electric motors, either in full or in part, as propulsion. This includes pure electrics, hybrids, plug-in hybrids, extended range electric vehicles and hydrogen fuel cell vehicles.
Extended Range Electric	A vehicle that uses an electric motor for propulsion but also has an internal

Vehicle (E-REV)	combustion engine onboard to provide power for a generator, which maintains a minimum charge level on the battery – as long as petrol in the tank is topped up, an E-REV has unlimited range. E-REVs can be plugged in and charged up, allowing an electric range of around 40 miles before the ICE fires up. Unlike a PHEV, E-REVs don't use the petrol/diesel engine to directly power the wheels.
Fuel Cell Vehicle (FCV)	A vehicle powered by a fuel cell, usually hydrogen. This is essentially an electric vehicle but using a liquid to store energy rather than a battery.
Fast Charge	Charging at a higher current than a domestic supply (about 7kW as opposed to 3kW). This will fully charge an average electric car in three to four hours. Rapid charging is quicker still (see below).
Fuel cell	An electrochemical cell that converts chemical energy directly into electric energy, as the result of an electrochemical reaction between reactants continuously supplied, while the reaction products are continuously removed. The most common reactants are hydrogen (fuel) and oxygen (also from the air).
Fuel cell vehicle (FCV)	A vehicle with an electric powertrain that uses the fuel cell as a source of the electricity to provide electric drive. FCVs may also include an electric storage system (ESS) and be HEVs or PHEVs. However, an ESS is not technically necessary in a FCV.
Full HEV	A full HEV has the ability to operate all-electrically, generally at low average speeds. At high steady speeds such a HEV uses only the engine and mechanical drivetrain, with no electric assist. At intermediate average speeds with intermittent loads, both electric and mechanical drives frequently operate together. A PHEV can be developed based on a full HEV powertrain.
Green House Gases (GHG)	A gas that in the atmosphere prevents heat from radiating back into space, and thus warms the earth (the greenhouse effect). Carbon dioxide (CO ₂) is the most common greenhouse gas. Methane (CH ₄) is another GHG, and has approximately twenty times the greenhouse effect as CO ₂ in the atmosphere.
Home Charging Unit (HCU)	A dedicated charging point for use at home. These incorporate a number of safety features to prevent fires or short circuits and often employ intelligent features such as timers and fast charging. HCU's aren't absolutely necessary but we recommend them for peace of mind.
Hybrid Electric Vehicle (HEV)	A vehicle which is powered by both electricity and another fuel, usually petrol/gas (eg Toyota Prius). This is usually just a more efficient way of using the standard fuel as there is no external source of electricity.
Hourly battery rate	The discharge rate of a cell or battery expressed in terms of the length of time during which a fully charged cell or battery can be discharged at a specific current before reaching a specified cut-off voltage. The hour-rate = C/i, where C is the rated capacity and i is the specified discharge current. For EVs, a 3-hour or a 1-hour discharge is preferred.
Hybrid electric vehicle (HEV) – Parallel configuration	A parallel hybrid is a HEV in which both an electric machine and engine can provide final propulsion power together or independently.
Hybrid electric vehicle (HEV) – Series configuration	A series hybrid is a HEV in which only the electric machine can provide final propulsion power.

Horsepower (HP)	A unit that is used to measure the power of engines and motors. One unit of horsepower is equal to the power needed to lift 550 pounds one foot in one second.
Hybrid	A car that integrates a small battery and an electric motor to enhance the efficiency of the engine. The battery's charge is maintained by the ICE engine - it cannot be charged by plugging into an electrical supply. Hybrids can offer greater fuel economy than a traditional ICE but can only travel very short distances on electric power only.
Internal Combustion Engine (ICE)	An engine powered through the burning of fossil fuels. The term 'ICE' is often used as shorthand for any vehicle powered by an internal combustion engine, whether petrol or diesel or any other flammable medium.
Induction motor	An alternating-current motor in which the primary winding on one member (usually the stator) is connected to the power source, and the secondary winding on the other member (usually the rotor), carries only current induced by the magnetic field of the primary. The magnetic fields react against each other to produce a torque. One of the simplest, reliable, and cheapest motors made.
Inductive charging	The use of magnetic coupling devices instead of standard plugs in charging stations.
Infrastructure	Every part of the system except the vehicle itself that is necessary for its use. For PHEVs or EVs the infrastructure includes available fuel (electricity), power plants, transmission lines, distribution lines, access to parts, maintenance and service facilities, and an acceptable trade-in and resale market.
Installed capacity	The total number of ampere-hours that can be withdrawn from a new battery cell, module, or pack when discharged to the system-specified cut-off voltage at the HEV, PHEV, or EV design rate and temperature (i.e., discharge at the specified maximum DOD).
Kilowatt-hour (kWh)	A unit of energy equivalent to the energy transferred or expended in one hour by one kilowatt of power. One thousand (1000) watt-hours of energy, which also equals 1.341 horsepower-hours (or 1.35962 CVh).
Level 1 EVSE	Level 1 Electric Vehicle Supply Equipment 120 volt Charging Equipment. Can fully charges EV in about 18 hours a PHEV may charge to capacity in six (6) hours.
Level 2 EVSE	Level 2 Electric Vehicle Supply Equipment 240 volt Charging Equipment. A faster and preferred way to Charge EVs or BEVs in no more than 8 hours depending on battery and vehicle type.
Level 3 EVSE	Level 3 Electric Vehicle Supply Equipment High voltage DC Charging Equipment. Requires three-phase electric service. The fastest way to recharge an EV or BEV to 80 percent capacity
Incentives	Many governments offer incentives to encourage buyers to choose an electric car. Grants towards the purchase price exist in many countries, for example the UK's Plug-in car grant, which offers 25% off a new electric car's list price up to £5,000. Other incentives for EVs can include free parking, zero road tax, low company car tax and exemption from city emissions and congestion charges.
Lead Acid Battery	A type of battery used in less modern electric cars. The energy density is much lower than that of lithium Ion batteries, which is the current standard. That means less power output and the need for more frequent charging. Lead acid batteries also have a shorter service life. They are, however, a lot cheaper than lithium ion batteries.
Lithium Ion Battery	These are the current standard in electric vehicle batteries, offering good energy density, power and fast charging ability. The life of a lithium Ion battery is estimated

	to be the same as the life of the car (eight to ten years). Of course 'end of life' here does not mean the cars or batteries won't work - after 10 years a lithium ion battery is expected to be at 80% efficiency, so they will still be usable - replacement will be a choice, not a requirement. Should you wish to replace your car's battery, it's possible they will still be in demand as storage devices for renewable energy in industry. They are expensive at the moment, but prices will reduce over time as more EVs hit the road.
LiCoO ₂	Lithium Cobalt Oxide battery chemistry
LiFePO ₄	Lithium Iron Phosphate battery chemistry
LiPo	Lithium Polymer battery chemistry
Maintenance-free battery	A secondary battery, which during its service needs no maintenance, provided specified operating conditions are fulfilled.
Mild HEV	A HEV that has a less powerful electric machine and battery pack than a full hybrid. According to the Netherlands Organisation for Applied Scientific Research (TNO), a mild HEV cannot operate all-electrically. Electric assist always works together with the internal combustion engine.
Motor, electric machine, generator	A motor is a label for an electric machine that most frequently converts electric energy into mechanical energy by utilizing forces produced by magnetic fields on current-carrying conductors. Most electric machines can operate either as a motor or generator. When operating as a generator, the electric machine converts mechanical energy into electrical energy. In HEVs, PHEVs, and EVs, electric machines operate both in motoring and generating modes.
Nano Crystalline Motor (NCM)	Conducts energy approx 10 times more efficiently than Iron core motors.
Neighborhood Electric Vehicle (NEV)	Used for short trips around ones community. Church, School, meeting, etc
NiCd NiCad	Nickel cadmium was a common battery chemistry used in many EVs of the 1990s as well as in consumer electronics. It is no longer in common use because of restrictions put on hazardous substances, which include cadmium.
NiMH Battery	Nickel metal hydride was a common commercial battery chemistry in the 1990s for consumer electronics. In the late 1990s it became the battery of choice for HEVs. It has higher gravimetric and volumetric energy density than nickel cadmium (NiCd), but lower than those for lithium-ion chemistries.
Nominal capacity	The total number of ampere-hours that can be withdrawn from a new cell or battery for a specified set of operating conditions including discharge rate (for EV, usually C1 or C3), temperature, initial state of charge, age, and cut-off voltage.
Nominal Voltage	The characteristic operating voltage or rated voltage of a cell, battery, or connecting device.
Normal charging	Also called slow or standard charge. The most common type and location for charging of a PHEV or EV battery pack necessary to attain the state of maximum charge of electric energy.
Opportunity charging	The use of a charger during periods of EV or PHEV inactivity to increase the charge of a partially discharged battery pack.

Overcharge	The forcing of current through a cell after all the active material has been converted to the charged state. In other words, charging is continued after 100% state of charge (SOC) is achieved.
Parallel battery pack	Term used to describe the interconnection of battery cells and/or modules in which all the like terminals are connected together.
Parallel HEV	A HEV in which the engine can provide mechanical power and the battery electrical power simultaneously to drive the wheels.
Particulate matter (PM)	A mix of chemicals in particulate form, emerging from the tailpipe of a vehicle or within air. Both tailpipe PM and PM concentrations in ambient air are regulated in most advanced nations. PM emissions historically have consistently been far higher from diesel (compression ignition) engines than from petrol (spark ignition) engines.
Peak power (in kW)	Peak power attainable from a battery, electric machine, engine, or other part in the drive system used to accelerate a vehicle. For a battery this is based on short current pulse (per 10 seconds or less) at no less than a specified voltage at a given depth of discharge (DOD). For an electric machine, the limiting factor is heating of insulation of copper windings. Peak power of an engine is generally related to mechanical capabilities of metal parts at peak allowable revolutions per minute, also affected by heat. Generally, continuous power ratings are well below peak power ratings.
PHEV	A HEV with a battery pack with a relatively large amount of kWh of storage capability, with an ability to charge the battery by plugging a vehicle cable into the electricity grid. This allows more than two fuels to be used to provide the propulsion energy.
Pb-Acid	Lead-Acid battery chemistry
Plugged-in Places	A UK government scheme that provides funding for specific regions to kick-start the use of electric vehicles locally and test charging infrastructure. Different 'PIP's are trialing different technology, with the results helping to inform national EV infrastructure decision-making.
Power	The rate at which energy is released. For an EV, it determines acceleration capability. Power is generally measured in kilowatts.
Power density (volumetric)	The ratio of the power available from a battery to its volume in liters (W/L). The mass power density in battery and EV industry is normally called specific power (see "Specific power") or gravimetric power density.
Pure Electric	A vehicle powered solely by electric motors using power provided by on-board batteries. The batteries are charged using electricity from the national grid.
Photovoltaic Cells (PV)	Used on solar panels to convert radiation from the sun into electricity. Solar panels are becoming much more commonplace and can be installed at home to help charge electric cars, allowing true zero-emission motoring and a large cost saving over time. Even in the UK, users report it is possible to completely charge electric cars using solar power only. Feed-in Tariffs may also allow unused electricity to be supplied to the national grid, meaning you could earn money from installing a solar panel.
Pulse Width Modulation (PWM)	A high-efficiency technique for controlling voltage output in a motor controller.
Partial Zero Emissions Vehicle (PZEV)	PZEVs meet SULEV tailpipe emission standards, have zero evaporative emissions and a 15 year / 150,000 mile warranty. No evaporative emissions means that they have fewer emissions while being driven than a typical gasoline car has while just

	idling.
Quadricycle	A four-wheeled vehicle with low power and of the same class as a moped or scooter. Electric quadricycles do not have the performance of the latest breed of electric cars and as they are not subject to the same stringent crash testing, safety is a concern. The Reva G-Wiz is an example of an electric quadricycle.
Rapid Charge	Rapid charging occurs only at dedicated locations and employs a 20-50kW current, allowing an 80% charge of a typical electric car in around 20-30 minutes. Some rapid chargers can top up the remaining 20% at a reduced rate in order to preserve the life of the battery. Regular rapid charging is not good for the long-term life of the battery, but does offer the chance to top up on the occasional longer journey.
Range	The distance you can travel on pure electric power before the battery requires a recharge.
Rated capacity	The battery cell manufacturer's estimate of the total number of ampere-hours that can be withdrawn from a new cell for a specified discharge rate (for EV cells usually C1 or C3), temperature, and cut-off voltage.
Range Anxiety	A term used to describe the fear of running out of battery while driving a pure electric car. Real-world accounts suggest range anxiety isn't as common as thought, and trials show that anxiety recedes over time as drivers become more comfortable with their cars' actual range capability.
Rechargeable electric energy storage system (RESS)	Battery packs, flywheels, and ultracapacitors are examples of systems that could be repeatedly charged from the grid, with the charge later discharged in order to power an electric machine to move a vehicle.
Regenerative Braking	An energy recovery system used in most electric vehicles that can help charge the battery while the car is slowing down. Typically the electric motor acts as the generator, so power can flow both ways between it and the battery. 'Regen' helps extend the range, while the process also help slow the vehicle in a similar way to engine braking in an ICE powered car.
Revolutions Per Minute (RPM)	The number of times the shaft of an electric motor turns through 360 degrees in one minute.
Self-discharge	The loss of useful electricity previously stored in a battery cell due to internal chemical action (local action).
Series HEV	A series hybrid is a HEV in which only the electric machine can provide final propulsion power.
Smart charging	The use of computerized charging devices that constantly monitor the battery so that charging is at the optimum rate and the battery life is prolonged.
Specific energy, or gravimetric energy density (of a battery)	The energy density of a battery expressed in watt-hours per kilogram.
Specific power, or gravimetric power density (of a battery)	The rate at which a battery can dispense power measured in watts per kilogram.
Start-stop	The lowest level of electrification of a powertrain, involving a slightly larger (higher kW) electric machine and battery than for starting alone, providing an ability to stop the engine when the vehicle is stopped and save fuel that would have been consumed

	at engine idle.
Start-stop + regeneration (and electric launch)	This technology package can also be called “minimal” or “soft” hybridization. According to the International Society of Automotive Engineers (SAE), a hybrid must provide propulsion power. If a start-stop system includes regeneration and electric launch, it is a hybrid, according to the SAE definition. If it does not, it is not a hybrid.
Three-phase electric power	In an AC motor in an electric vehicle, three-phase current is used instead of single phase, as it generates a rotating magnetic field from zero RPM and is typically 150% more efficient in the same power range. In other words, high torque at zero revs is made possible by a three-phase system on an AC motor.
Torque	The twisting force that causes rotation. In the case of cars, torque rules and is the major factor in a car’s accelerative ability – with generous torque, the car’s throttle response is much sharper. Petrol and diesel engines deliver torque over a curve as RPM increases, meaning they have peak power at a given RPM. Electric motors, on the other hand, deliver maximum torque from zero revs, meaning acceleration from standstill can be phenomenal.
Useable capacity	The number of ampere-hours (or kilowatt-hours) that can be withdrawn from a battery pack installed in a PHEV, taking into account decisions on control strategy designed to extend battery pack life or achieve vehicle performance goals (refers to a minimum power level). Useable capacity is a smaller number than nominal capacity.
Vehicle-to-Grid (V2G)	Transferring electrical current from the battery of an electric car back into the National Grid while plugged in to the mains. V2G could help balance the grid in periods of high demand, alleviating the risk of power cuts.
Volt	A unit of potential difference or electromotive force in the International System units, equal to the potential difference between two points for which one Coulomb of electricity will do 1 Joule of work in going from one point to the other. The volt unit is symbolized by “V”.
Voltage efficiency	The ratio of the average voltage during discharge to the average voltage during recharge under specified conditions of charge and discharge.
W2W	"Well-to-Wheel" - measuring the CO2 emissions of a car, taking into account the production of the fuel or electricity. This is a fair analysis of the impact on the environment of electric vehicles, as they have zero emissions at point of use but clearly have an environmental impact earlier in the chain. However, for a fair comparison with an ICE vehicle, W2W must also be calculated in the drilling of the oil, refining and transportation, not just the tailpipe emissions. Taking this into account, an average electric vehicle will produce 80g/km of CO2 compared with 147-161g/km for an ICE (source: SMMT).
Watt-hour efficiency	The ratio of the watt-hours delivered on discharge of a battery to the watt-hours needed to restore it to its original state under specified conditions of charge and discharge.
Watt-hours per kilometer	Energy consumption per kilometer at a particular speed and condition of driving. It is a convenient overall measure of a vehicle’s energy efficiency. Watt-hour efficiency = Ampere-hour efficiency x voltage efficiency.
Zero Emissions Vehicle (ZEV)	ZEVs have zero tailpipe emissions are 98% cleaner than the average new model year vehicle. These include battery electric vehicles and hydrogen fuel cell vehicles.
