**AUSTRALIAN HYDROGEN R&D PORTAL – PROJECTS LISTING**

**Guidance notes for Project Description Template Completion**

***CSIRO and the Australian Hydrogen Research Network (AHRN) are working collaboratively to establish an online portal and database that provides information on Hydrogen R&D activities within Australia.***

***The following provides guidance notes on completion of a project description template that would provide basic core information on an R&D project for display on the Portal.***

**Contents**

1. **Projects to be included**

This section describes the nature/manner of projects for inclusion in the Portal and the process for updating included descriptions.

1. **Project description template – guidance notes**

This section provides guidance notes on completing the project description template that forms the basis of the Portal ‘Projects’ page (and informs the key data shown on the Projects home page tabular listing of projects).

It is important that ***layman’s language*** is used; website traffic from all stakeholders is anticipated.

1. **Hydrogen supply chain: R&D focus areas – key words**

This section is especially important and describes the hydrogen supply chain key words for use in completing the ‘R&D focus areas’ part of the Template, and which will also be a key cell entry in the Projects home page tabular listing of projects. To support efficient user search/filter processes, ***it is critical that the key words are used in robotic fashion, exactly as described in this section; deviations will not work***.

In case multiple key words are required, please **use a maximum of the top three listing** of key words.

1. **Project Description Template – sample completed description**

This section includes a sample dummy completed description for reference as to manner and style of completion. This is not a real project description, it is a work of (science) fiction.

As a key function of the Portal is to foster connections among the research community, it is important that readers at the very least gain an appreciation of the nature of the research being undertaken and the key researchers/organisations undertaking the research (as much as can be made publicly available).

1. **Projects Description Template – ready for completion**

This section includes the clean description template for completion and onforwarding to the project Portal team, specifically:

[peter.grubnic@csiro.au](mailto:peter.grubnic@csiro.au)

1. **Projects to be included**

Defined as:

* having a sole or substantial research focus on an element or elements of the hydrogen value chain.
* were active in 2018 or became active in and since 2018
* may include collaborations with industrial organisations that can be publicly described in full or large part as per the project description template overleaf

Most obvious candidates are projects linked to funding sources. As a start, Portal projects must align with / be consistent with publicly accessed ‘project’ awards or listings, such as for:

* Australian Research Council (ARC) project grants
* Cooperative Research Centres with hydrogen supply chain related projects
* ARENA funded R&D projects
* Other publicly listed projects from major programs

The above sample includes projects funded through several of the main national R&D funding programs. As a sample, they do not cover all the national programs that provide support for hydrogen supply chain R&D projects nor those provided by State programs nor through private-public / public-private-research partnerships or collaborations of varying kinds (nor through solely University funded projects).

The Portal is intended to access this full range of funded projects for inclusion.

Each R&D project would consist of a set of activities that can be linked to funding sources, would be organised and managed for a specific purpose, and would have its own objectives and expected outcomes.

It is critical that Portal information is kept current or its value diminishes greatly.

* New projects would be included (as advised by researchers or CRC management teams) as they become active.
* Template information on existing projects ideally would be updated in as close to real time as possible as changes in the key parameters occur. Regular reminders to the R&D community would follow via AHRN communications. To supplement this process, a six-monthly review process will also be put in place.

1. **Project description template – guidance notes**

**Project Title**:

Include project title here

**R&D Focus Areas**:

Please include here the relevant key word(s) from the listings shown overleaf. Multiple key words can be accepted. **For optimal search filtering, key words usage must be exactly as shown overleaf – deviations from this nomenclature will not work. In case multiple key words are required, please use a maximum of the top three listing of key words**.

**Lead Organisation**:

Include name of lead organisation or organisations here

**Partners**:

Include name of any project partners here; if no partners, please type in Not Applicable

**Status**:

Choice of Completed or Active, as relevant for this project

**Start date**:

Include month and year please

**Completion date**:

Include month and year please if actual or estimated completion timing is known/defined, or just year if completion timing is less defined

**Key contacts**:

Include the name or names, email addresses of lead and other key researchers engaged on this project.

**Funding**:

Include main funding sources supporting the Project activities and amounts provided where this data is publicly available/can be made publicly available on this website; e.g. ARENA, Australian Research Council, specific name of Cooperative Research Centre, etc.

**Project total cost:**

As can be made publicly available, please provide amount of total project costs and include whether this is cash contribution only or combined cash+in-kind contribution.

**Project summary description**:

Include a summary 2-3 paragraphs describing the nature of the projects intended aims, any key outcomes achieved, etc (which can be publicly disclosed). If a more detailed description is easily provided, please do so. To reach the fullest stakeholder audience of this site, **layman’s language** should be employed as much as possible. Key aim is to foster researcher connections.

**Related publications and key links**:

Include titles of/links to publications/reports/etc. that have resulted from activities undertaken as part of this project. This can be journal articles, published theses, reputable media reporting, conference presentations, etc.

**Higher degree studies supported**:

Include as you wish to make publicly available, the number of PhD and/or Masters students-by research whose research thesis or similar is solely or substantially supported by the activities of the project and is of a length of 2-4 years. Identify separately PhD/Masters by research students. Include fullest information as you wish to make publicly available.

1. **Hydrogen supply chain: R&D focus areas - key words**

**(In case multiple key words are required, please use a maximum of the top three listing of key words.)**

**Whole supply chain:** key words below

Whole supply chain

**Hydrogen production**: key words below

Biological hydrogen production

Biomass and waste conversion

Direct hydrogen carrier production

Electrolysis

Fossil fuel conversion

Natural hydrogen

Photochemical and photocatalytic processes

Thermal water splitting

**Storage**: key words below

Compressed gas

Cold/cryo compressed

Liquid hydrogen

Ammonia

Hydrides

Liquid organic carriers

Synthetic fuels and chemicals

Adsorbents

Proton Batteries

Underground storage

Pipeline storage

**Distribution and supply**: key words below

Pipeline materials and performance

Pipeline design and integrity management

Pipeline and network operations

Hydrogen embrittlement

Non-pipeline non-export supply technologies

*(Note: shipping technologies supporting export potential is covered under* ***Utilisation)***

**Cross-cutting**: key words below

Separation materials and technologies

Specialised components and devices

Advanced manufacturing

Technology integration process improvement

Water use and treatment

Land use and ecological impacts

Emissions and atmospheric impacts

Materials and waste management

Safety and standards

Social licence

Socio-technical risks

Local communities

Indigenous culture and communities

Communication and engagement

Techno-economic evaluation

Geographical modelling

Computational modelling

Materials modelling

Nanomaterials

Energy systems integration

Sector coupling

Supply chain integration

Hydrogen market development

Policy

Regulations

Hydrogen certification schemes

Skills and labour market

**Hydrogen utilisation**: key words below

Electricity *(includes grid balancing & stability, grid integration, stationary fuel cells, engines & turbines)*

Export potential *(includes shipping technology development, loading/offloading, infrastructure optimisation from production site to port loading site)*

Gas networks and appliances *(includes appliance testing, metering, hydrogen gas separation)*

Heat storage *(covers thermal batteries based on metal hydrides)*

Industrial heat processes *(includes steel, cement, metals refining, etc.)*

Industrial feedstock processes *(includes ammonia, synthetic fuels, and methanol production)*

Mobility (*includes mobile fuel cells; onboard storage; refuelling stations; bunkering: land, sea, air mobility forms; vehicle/engine improvements)*

***(Note: information in brackets above acts only as content guidance as each utilisation key word/words can cover a wide range of optionalities; information in brackets is not to be used as key words)***

1. **Project description template – sample completed description, not a real project**

**Project Title**:

A review of the Klingon and Romulan use of clean hydrogen mechanisms in neutral zone terraforming activities and implications for Federation colonisation efforts

**R&D Focus Areas**:

Photochemical and photocatalytic processes, Energy systems integration

**Lead Organisation**:

Starfleet Academy

**Partners**:

Kardashian University of Advanced Engineering, Dalek Peace Institute, Grubnic Galactic Industries (GGI), Tyrranid Investments

**Status**:

Active

**Start date**:

July 4056

**Completion date**:

Estimated December 4060

**Key contacts**:

Lead Investigator Maximus Potter - email address

Academician Professor Dr. Jonathon Smith – email address

Chief Engineer McDonald Scott – email address

**Funding**:

AUD$500,000 – United Federation of Planets Terraforming Fund

AUD$300,000 – 2M Institute for the Advancement of Science

AUD$200,000 – Tyrranid Corporation

**Project total cost:**

AUD$2,000,000 – combined cash and in-kind contribution

**Project summary description**:

*(Note: below is a fullest description, 2-3 paragraphs can suffice; the main element is to provide sufficient information on the nature of the project that can help foster connections.)*

The aim of this project is to investigate the efficacy of efforts by the Klingon and Romulan empires aimed at terraforming planets in the neutral zone bordering the Federation into hydrogen-rich bodies, such terraforming efforts including the massive use of photochemical and photocatalytic processes, and its implications for like-minded Federation terraforming efforts.

The research makes extensive use of librarium investigations, includes the construction of large-scale manufactorium plants on unpopulated Federation plants, such plants being analogous to those employed at scale at Eridanus A in the neutral zone, as well as clandestine scientific reports prepared by agents of the Federation currently employed at Eridanus A.

Initial results indicate that, in the absence of a nearby solar energy source, terraforming efforts are proving especially costly to the Klingon and Romulan empires. Imported adamantium-based exotic catalytic systems have not proved viable.

Experimental efforts at the Federation manufactorium plants have indicated that upper atmosphere use of cyclonic torpedoes to activate novel ‘Genesis Device’ technologies, when integrated with serpentine catalytic systems, may result in the establishment of hydrogen-rich planets at a fraction of the cost currently being experienced by Klingon and Romulan efforts (through accelerated spread of neutronium crystals).

Beta-3 modelling by farsighted navigators on planet Osiris has suggested a small chance that use of cyclonic torpedoes in concert with Genesis Device technologies may result in a fracturing of a planet’s mantle. Future Federation efforts will further investigate the opportunities and risks of integrating the use cyclonic torpedoes in accelerating terraforming efforts aimed at the creation of hydrogen-rich planets for colonisation purposes.

**Related publications and key links**:

Smith, Jones, Doyle, and Baxter, *A history of the use of photocatalytic systems in terraforming planetary systems*, Galactic Journal of Advanced Engineering, Volume 651. *Link to journal article*.

Sejanus, *The use of cyclonic torpedoes in an integrated terraforming systems approach in the creation of hydrogen-rich planets,* Readers Digest, Volume 15,587. *Link to Readers Digest article.*

**Higher degree studies supported**:

Two PhD students at the Kardashian University of Advanced Engineering are supported by this project.

Two Masters by research students at Starfleet Academy are supported by this project.

1. **Project description template – ready for completion**

**Project Title**:

XXXXXXXXXXXXXXXXXX

**R&D Focus Areas**:

XXXXXXXXXXXXXXXXXX

**Lead Organisation**:

XXXXXXXXXXXXXXXXXX

**Partners**:

XXXXXXXXXXXXXXXXXX

**Status**:

XXXXXXXXXXXXXXXXXX

**Start date**:

XXXXXXXXXXXXXXXXXX

**Completion date**:

XXXXXXXXXXXXXXXXXX

**Key contacts**:

XXXXXXXXXXXXXXXXXX

**Funding**:

XXXXXXXXXXXXXXXXXX

**Project total cost:**

XXXXXXXXXXXXXXXXXX

**Project summary description**:

XXXXXXXXXXXXXXXXXX

**Related publications and key links**:

XXXXXXXXXXXXXXXXXX

**Higher degree studies supported**:

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