

**2021 INFORMATION KIT
PART B: INNOVATIONS**

ENERGY BREAKTHROUGH

17-21 NOVEMBER 2021 | MARYBOROUGH, VICTORIA

POWERED BY IMAGINATION

THE PREMIER SCIENCE, TECHNOLOGY, ENGINEERING AND MATHS, ACTIVE LEARNING PROGRAM

A PARTNERSHIP BETWEEN



eb.org.au

INNOVATIONS IN TECHNOLOGY

Proudly supported by Central Highlands Water

[Version 2021.01](#)

Introduction

- These specifications cover the Innovation In Technology category.
- [Any significant changes from 2019 have been highlighted and underlined in blue.](#)
- Key specifications that the Organisers wish to bring to the attention of Team Managers have been highlighted in bold.
- If changes are made to these specifications prior to the event, Team Managers will be notified via email and a new edition will be published on the website.
- The Energy Breakthrough Organisers have the final authority to decide if any craft or team participates in the event, based on safety and their interpretation of the following rules.
- All enquiries regarding these specifications should be emailed to enquiries@eb.org.au

1 OVERVIEW

The Innovations in Technology category has been proudly supported by Central Highlands Water for over a decade. It provides a unique but accessible challenge for students of all ages to engage with a one day activity in Maryborough during the Energy Breakthrough.

The Energy Breakthrough presents a unique opportunity for students to extend their learning experience beyond the boundaries of formal education. The following regulations have been framed so that the efforts and experiences of all participants are maximised, to be bound only by the constraints of safety and the spirit of healthy, but friendly competition.

In 2021, there will be two types of challenges in the Innovations in Technology category:

- Crafty Design
- Junkyard Challenge

2 ENTRIES

2.1 Categories, Classes and Quotas

Category	Class	Quota
Innovations in Technology	Crafty Design A	30
	Crafty Design B/C	
	Junkyard Challenge Class A	12

2.2 Team composition

- All entries are to be team entries and must consist of current school students.
- All team members must be familiar with the operation of their craft or creation, and must participate equally in the assessments at the event in Maryborough.
- Team members do not have to all come from the same school. They could be part of a scout, church, or other community group, however they must all be current school students and be covered by the group's insurance.
- Teams in the Innovations in Technology category must have:
 - a minimum of four (4) and maximum of six (6) in Crafty Design
 - a team of four (4) for Junkyard Challenge.
 - at least half of whom must be female.

2.3 Category caps, changes and waitlists:

- Crafty Design has no limit with the number of entries per school while a maximum of two entries per school will be accepted in Junkyard Challenge
- Additional entries from a school will be placed on a waiting list and will be notified if accepted into the event.
- Correspondence regarding the status of entries on a waiting list will be made directly to a Team Manager only.

3 ASSESSMENT

3.1 Overview

The Energy Breakthrough Innovations in technology is unique in that all teams must compete across the two areas of assessment: Design and Construction/Display and Presentation and Trials.

All sections must be attempted, and points are awarded in the following sections:

Crafty Design:

Section	Points
Design & Construction and Display and Presentation	75
Performance Test	25
Total	100

Junkyard Challenge

Section	Points
Design, Construction and Performance Test	100

It is the responsibility of each team to ensure they complete all appropriate sections.

The schedules for each of activity are outlined in this Handbook.

Further details will be provided in an Information Kit distributed in November.

3.2 Scrutineering

Crafty Design models will be checked during the Display and Presentation section for safety issues.

Junkyard Challenge designs will be observed during their construction for any safety issues.

4 CHALLENGE 1:

Crafty Design – Working With Water

4.1 Overview

Ages: Open to Primary students in Years 3, 4, 5 & 6 (Class A) & Secondary students (Class B).

Challenge:

The challenge for Crafty Design is for the craft to travel under its own power, along a water channel of 9.4 metres x 81.5 cm, carrying a reusable bottle filled with water (300 to 400ml).

Classes: 1. Solar, Elastic or Mechanical Crafts
2. Compressed Gas or Compressed Air Crafts

4.2 Materials and Specifications

- Teams may use construction materials such as TEKO, LASY and LEGO, in conjunction with scrap or recycled material to create their craft.
- [In 2021, students will no longer have to create a craft representing an invertebrate, but in their presentation, as well as discussing the development of their craft, they must talk about one invertebrate that lives in water.](#)
- The craft should be stable in the water without student intervention.
- The craft must be able to run under its own power along a water channel of 9.4 metres long x 81.5 cm wide.
- Please note that the water depth of the channel is approximately 12 cm.
- Craft must complete one full length of the channel and two trials will be held.
- The craft must be able to maintain a direction within a lane, towards a designated target area on the end and must complete the course within a set time of three minutes.
- The craft's length and width must be less than 81.5 cm.
- The fuel source must be an alternative to fossil fuel.
- No dry cell batteries or capacitors are permitted to be used.
- To encourage greater innovation in design, students are encouraged to incorporate solar, elastic, compressed gas, or compressed air into their designs. (no soda syphon bulbs or air compressors can be used)

4.3 Judging Criteria:

- All information relating to assessment of Crafty Design is to be presented on a poster approximately 65cm wide x 85cm high (thick cardboard backing is recommended).

- Each team will be allocated 20 minutes in which to present and discuss their entry with the judges.

Judging will include assessments in the following areas and may be included on the poster:

Safety - including energy source; the load (reusable bottle); moving parts are shielded.

Innovative Construction - materials used; design originality and imagination; artistic form, student input, community involvement. Use of recycled material (teams should look to improving craft each year and modify). Recycling does not mean use of exactly the same model - recycling of materials is encouraged, NOT the recycling of crafts!

Planning and Testing - includes challenges and problems encountered during planning/construction; ability to identify how the model could be improved, modified, given time and appropriate materials.

Presentation – Introduction, speaking without notes, clear speech, use of diagrams, photos colour; originality; evidence of teamwork; involvement of school, community and/or industry. Highlighting environmental issues, water conservation, and use of alternate energy sources and recycling.

Model/Craft – The craft has been designed and constructed by students; potential ability to move in water; successfully negotiates two trials; craft shows detail in its construction and appearance.

Environment – How this activity relates to the aims and values of the Energy Breakthrough. Knowledge about the chosen invertebrate

4.4 Performance Test and Time Trial:

All entries are required to demonstrate their craft in operation and complete two Performance Tests per craft in the tank.

The craft will be judged:

- How it shows advancement in technology
- Along with its reliability, sustainability and efficiency.
- Higher marks will be awarded for completion of the task without any assistance from the team.
- Time for the trial will be awarded scores with the fastest obtaining the highest score, the slowest the least.
- Time will be taken for the best of the two Performance Tests.

5 CHALLENGE 2: Junkyard Challenge – Better Bridges



5.1 Overview

Ages: Open to Primary students in Years 3, 4, 5 & 6 (Class A)

The Challenge:

Do you have creative problem solvers and budding engineers?

The Junkyard Challenge will involve teams of 4 who will be provided with a range of materials and be required to create a structure that will span 1.5 metres. This creation will be required to support a 4 litre container of water by the end of a 90 minute time limit.

The types of materials available will be a mystery to the teams, but they are likely to include recycled items – some useful, some not! It will be up to the team to decide which materials they would like to use and how they will build their structure.

5.2 Equipment provided

The types of materials available will be a mystery to the teams, but they are likely to include recycled items – some useful, some not! It will be up to the team to decide which materials they would like to use and how they will build their structure. Electric drills will be available to share in central locations.

Basic Pack:

EACH team will receive this BASIC PACK consisting of:

- Design pack: Paper & pencils.
- Retractable tape measure.
- Fine nib texta.

Tools:

- Scissors.
- Pliers.
- Hacksaw (2 blades)
- Retractable Stanley knife.
- Safety Glasses (2 per team).
- Cutting board (NOT TO BE USED INSTRUCTURE)

Connectors:

- Gaffer tape.
- Rayon cloth tape.

- Roll of thin tie wire.
- Zip ties.
- Bag of Rubber bands
- Ball of string.
- 2 bike tubes

5.3 Junkyard Materials

Materials will be available on the day to assist your construction! (*That's the mystery*)

- There will be a work station where several adults will supervise the children using the drills, spare Stanley blades also available.
- All team members will have their 'Tools and Equipment Licences' signed off by their supervising teacher /mentor prior to the event. Licences will be provided in term 4.
- All team members MUST display good occupational Health and Safety practices at all times – or risk being excluded from the event. (Safety glasses are a MUST when drilling).
- Optional: teams may display a team banner up to A2 size.

5.4 Process

- The teams will start with a 10-minute discussion time and then have 80 minutes to build their structure. Then teams will check their structure against the criteria.
- Each team may bring a mentor with them to help during the discussion phase and to assist in the sharing of ideas, supervise students and maintain safe practice.
- After the first 20 minutes of build time all adults must step back into advisory roles only.
- Points will be deducted for adult intervention after this initial 20 minutes period.
- Please respect that this is a thinking-doing-learning engineering experience for young people.
- The Mentors could be a parent/teacher. If the team is unable to organise a mentor, please let the Planning Committee know prior to the event.
- Students may Barter & Swap what is in the junkyard collection during the time.

5.5 Finished Product

The structure MUST be able to support a 4 litre bottle of water (4kgs).

Presentations will be made immediately after the test period is completed.

6.5 Judging Criteria:

A judging rubric will be emailed to participating schools in Term 4.

"The Best Bridge Trophy"

Judges will be looking for the structure that resolves the task, effectively and elegantly. Fitness for purpose and aesthetically pleasing, will win the day.

Special Award – "Working under Pressure"

For the team that has demonstrated throughout the entire project – consistently sharing ideas & tasks and therefore working together to solve issues as they arise. Your machine may not work the best, but you could be the best working team.

6.6 Useful ideas

As this challenge requires students to respond in diverse and interesting ways, it is suggested that participants utilise the internet to gain insights and options as to how they might respond to the project task, in the lead up to the event. Information is power.

6 PROPOSED PROGRAM

INNOVATIONS IN TECHNOLOGY



THURSDAY 18 NOVEMBER

9am – 5pm Registration open
Location: Administration Centre

No activities.

FRIDAY 19 NOVEMBER

9am – 5pm Registration open
Location: Administration Centre

No activities.

Note: Innovations in Technology teams must register on Thursday or Friday. Saturday registrations will only be completed by prior arrangement with organisers.

SATURDAY 20 NOVEMBER

9.00 am - 1.00 pm Crafty Design: 'Working with Water'
Location: Display & Presentation marquees.
- Design & Construction.
- Display & Presentation.

11am - 1.00pm Junkyard Challenge
Location: Display & Presentation Marquee.
- Building; Testing constructions; Presentation.

1.00pm Crafty Design Performance Test
Location: Water troughs, near Display & Presentation marquees.

3.30 pm Presentation Ceremony (Primary)
Presentations will commence shortly after the completion of the
Performance test.
Location: Presentation Stage near Water troughs.

SUNDAY 21 NOVEMBER

No activities.

* PLEASE NOTE THAT THIS TIMETABLE IS SUBJECT TO AMENDMENTS.



Central Highlands Water is committed to environmental education.

They are proud sponsors of the Innovations in Technology category of the Energy Breakthrough and are looking forward to helping provide hands-on learning opportunities for participants again this year.

For more information about our education program, please contact:

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ROAD CLOSED

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BURNS ST






CIRCUIT LENGTHS

TRACK 1 - 1.58 km















REGIONAL ROADS - 1.11 km



KEY

-  Toilets
-  Showers
-  Camping Area
-  First Aid
-  Food & Refreshments

ENERGY BREAKTHROUGH SITE

-  Assembly Point
-  Marshall Point & Number
-  Track Direction
-  Start/Finish
-  Pushcart Changeover Point
-  Repair Station
-  Recharge Station
-  Parking Area
-  Future of Transport Expo
-  Hospitality Marquee
-  Wrist Banding Station
-  Stage
-  Road Closure
-  Drinking Water