The Genesis Energy National Science & Technology Fair

Genesis

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Acknowledgements

Colin Percy, chief judge for many years up to and including 1991, laid the foundation of the current judging procedures and science criteria, distributed to regions over the last few years as the booklet "Judging Science Fair Projects", detailing judging criteria and procedures, and award ceremony arrangements.

Tony Mander, chief judge 1992–95, revised that booklet to produce this 'Judging Handbook', and developed judging sheets and the judging criteria for technology exhibits.

Further changes have been added by Barbara Benson, chief judge from 1996, and Glenys Ross from 2000.

Judging Handbook

2000 Genesis Energy
Science and Technology Fair

Introduction

The information in this booklet reflects the rich experience of Science Fairs in New Zealand, and with the inclusion of judging criteria for technology, the recognition that we are also an increasingly technological society.

Judging is the most contentious aspect of a Science and Technology Fair; it is far from an exact science and in reality must balance a wide range of diverse criteria. The high quality of our judging is validated by the regular success of our award winners in international science and technology fairs. Regional fairs generally have a diversity of awards reflecting the spectrum of scientific and technological endeavour. However, this diversity increases the difficulty of selecting regional exhibits for the Genesis Energy National Science and Technology Fair, where one or more exhibits have to be selected as 'the best' of each region. In addition, the value of awards, the wide age-range of exhibitors, the use of computer modelling techniques, a greater range of presentation media and the need to balance the differences between science and technology, have all made the judging process more demanding.

This Handbook is distributed to regional judging panels so they are aware of the criteria used at national level so that their choice of exhibits will be appropriate.

The Handbook has these sections:

1 The selection of exhibits at regional level, including checklists on the choice of appropriate criteria and on the attributes of exhibits.

2 The judging panel responsibilities, a brief description of the judging procedures and a brief discussion of the issues facing the judging panel, including a simple model distinguishing technology and science.

3 Judging criteria. This includes the judging sheets with separate science and technology criteria. An exhibit will be judged using appropriate criteria selected from both forms.

4 Suggestions for interviewing exhibitors.

5 The awards at the Genesis Energy National Science and Technology Fair

Judges of regional fairs should note:

1 This Judging Handbook is produced primarily for the use of judges at the Genesis Energy National Science and Technology Fair, where exhibits receive intense scrutiny from a judging panel larger in proportion to the number of exhibits than is possible at a regional fair.

2 Regional fair judges should produce their own judging guidelines. As they have a greater number and range of exhibits the procedures and criteria need to be simpler. Only those exhibits likely to be considered for selection to the National Fair need have a greater depth of scrutiny.

3 It is recommended that regions use a **senior judging panel** to select their major award winners. This panel should be made up of about three or four experienced judges who reflect a balance between science and technology. Regions should include in this panel a member of the core national panel, if available, and people in their area who have experience judging at the national level. Judges in charge of each section would make their recommendations to this panel.

Use this column for your notes

Section 1

Selecting exhibits

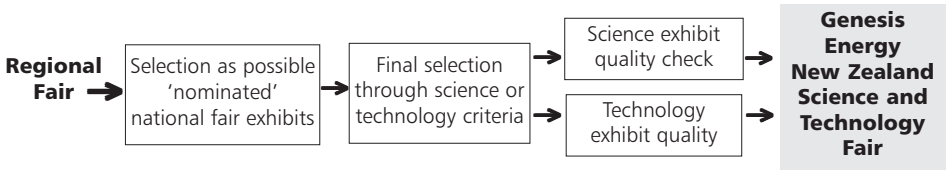
for the

Genesis Energy National Science and Technology Fair

There are two ways exhibits are selected for display at the Genesis Energy National Science and Technology Fair:

1 **One 'as of right' exhibit** from each regional Science and Technology Fair. These exhibits must meet the judging criteria for the **Genesis Energy National Science and Technology Fair** as described on pages 6–7 of this handbook. The selection and nomination of an 'as of right' exhibit is entirely in the hands of the senior judging panel referred to on page 1.

2 **As a 'nominated' exhibit**, selected by a group from the national judging panel from nominations by regional fairs. The number of additional places available varies from year to year and these exhibits are accepted only on merit. The only restriction placed on regions is that they can submit up to a maximum of three exhibits for consideration for the nominated places.



The selection pathway of an exhibit is of no relevance when it is judged at the national fair.

Regional and National Fair differences

Exhibits from regions are expected to have received considerable scrutiny during selection and to have been nominated for their level of performance against relevant science and/or technology criteria. Exhibits at the national fair are exposed to even more rigorous scrutiny, to national publicity, and to examination and questioning by national experts through the publicity. It is unfair on an exhibitor to nominate their exhibit if it has basic errors or is of a low standard; it is preferable to not send an exhibit. Both the exhibit (and the exhibitor) should be able to stand up to this public scrutiny, and regional judges need to be aware of the required standard of exhibits. Accordingly, regional chief judges will have an opportunity to be on the national judging panel.

Regions are responsible for their own judging criteria, although they are advised to use the national judging criteria when nominating their exhibits for the national fair. Regional judges are expected to apply the most appropriate criteria when judging an exhibit, which for some exhibits may be a mix of science and technology criteria.

Regional fairs may have any diversity of classes they wish, although it may be that classes or sections such as 'Models', 'Innovations', 'Inventions', etc., may not be as relevant now with the inclusion of technology. The National Fair has no classes or sections of exhibits of any form, whether by age, topic, or discipline of study, and the national judging panel reserves the right to judge an exhibit on what they consider to be the most appropriate criteria.

The table on page 11 is a guide to **identifying** which **criteria** to use when judging an exhibit, with **quality checklists** on pages 6 and 7 for nominated exhibits.

Exhibits and exhibitors

To assist regions in distinguishing when to use science or technology judging criteria, and in checking whether an exhibit meets the minimum level of quality when nominating exhibits, checklists have been provided on pages 6 and 7.

Exhibits are expected to have been checked at regional level that they meet:

- the requirements for exhibit size and for safety of observers, especially where toxic substances, bacteria or other elements requiring restricted access were used;
- the relevant safety regulations for electrical connections, where applicable;
- the relevant animal ethics requirements if live animals are involved;
- the relevant human ethics and health and safety protocols if people were involved as subjects in any way.

Exhibitors are expected to be knowledgable about their exhibits and able to communicate effectively and discuss their exhibit. However, the focus will remain on an exhibit being able to be judged fairly without relying on input from the exhibitor.

Changes to exhibits after regional selection

Exhibitors are not expected to make substantive changes to their exhibits for the Genesis Energy National Science and Technology Fair. They should certainly consider improving their display, but their experimental design, data, computer program or equipment are expected to remain much as presented for the regional fair. However, if errors were found during regional judging it would be appropriate to fix these, as exhibits at the national fair are expected to be of a level suiting their 'best of regional fair' status and to withstand the intense scrutiny from judges and from interested experts visiting the fair.

The reason for encouraging improvements to display and report materials, but leaving the core data and experimental design unchanged, is in the interest of fairness to exhibitors, as those selected at later fairs do not have the same opportunity for revision. It is also in fairness to judges who selected an exhibit for the Genesis Energy National Science Fair on its qualities at the time of selection.

Nominating additional exhibits

A variable number of places are available for exhibits additional to the 'as of right' group. Chief judges of regional fairs are to make application for these places by submitting a description of nominated exhibits on videotape as described below.

Video is required

For the national judging panel group to make their selections they require sufficient information from the regional judges about their nominated exhibits. Mindful of the additional workload that these judges' evaluations could impose, the requirement is a 'home video' on VHS or VHS-C format. A video is less work for regional judges (who would otherwise have to prepare illustrated documentation of the exhibit) and, if carried out according to the instructions below, is more informative for the selection panel.

Please follow these instructions when producing your video

(a) First, check the quality of the exhibit using the criteria on pages 6 and 7 of this Judging Handbook. If you are unsure which criteria to use the checklist on page 11 should be useful.

(b) From your judging records prepare a list of the strengths and weaknesses of the exhibit. Rank them in the order of the judging criteria on the judging sheets on pages 20 and 21. For example, for an exhibit selected only on science criteria, the problem/hypothesis would be briefly described followed by a description of the data gained and its analysis and significance, why the exhibit is regarded as having sufficient originality, how thoroughly the exhibitor investigated the topic, the level of technical skills and perhaps a brief comment on the quality of presentation (which should speak for itself on the video and require little comment).

(c) Arrange to film the exhibit in quiet and well-lit surroundings (the exhibition venue is probably suitable provided there is **no** background noise). Starting with the (VHS/VHS-C) video 'camcorder' on a tripod and showing the whole exhibit, clearly give the **title of the exhibit**, the **age** of the exhibitor/s, and the name of your **regional fair** (important should the tape and its label become separated).

(d) Using the list of criteria, clearly show the strengths of the exhibit. Use a pointer to indicate them and have the person on the camera zoom in to that feature if required. (The pointer is suggested as it is not necessary for you to appear on camera.)

No editing is needed, deficiencies in video production are ignored. The most important element is to have sufficient information about the exhibit. You may need to pause the camera while moving it to show particular features. It would be wise to test it by letting the camera run for 30 seconds or so and viewing the playback in the viewfinder to check the lighting.

Be careful to provide information about **why** the judging team regard it as being good enough for national exhibition. For example, if focusing on the experiments, say what they were, how often they were carried out, how the results were processed, what their significance was and how they contributed to the quality of this exhibit.

(e) Be succinct in your description; the video should last no more than 4–5 minutes.

(f) Do **not** show the exhibitor and under no circumstances have them describe their exhibit. We want to know what the **judges** regarded as of sufficient standard for nomination; you will disadvantage the exhibitor if you insist on showing them on camera.

(g) Include a form with the videotape with this information: (see page 5)

Name of regional fair

Contact person to whom tape or documentation will be returned (postal address & phone number)

Exhibit titles listed in rank order with the name and age of each exhibitor.

Additional information required

In addition to the video, regional chief judges are asked to:

(a) complete the form summarising the main points of the exhibit. This form is in the pack sent to the regional chief judges;

(b) obtain from the exhibitor a printout of the text that is on their board.

Number of exhibits

Up to three additional exhibits may be nominated per region.

Submitting nominations

1 Immediately after selecting your nominations, post the tape or documentation to:

Glenys Ross
83 Landing Road — Phone 09 407 9763
Kerikeri, Northland — Email: gross@zip.co.nz
Include a return address.

2 The applications must be received no later than **two weeks** after your regional judging day.

3 Occasionally the senior judging panel at a regional fair may feel that no exhibit is worthy of entry to the national fair. In this case a member of the core national panel would be happy to look over the exhibit and advise accordingly. If you would like this done, send the same information as you would send with a nominated exhibit and a covering letter.

Exhibit nominations videotape label

Include with the videotape.

Regional fair _____

Return to _____

_____

_____

1 Exhibit title _____

Exhibitor _____ Age _____

2 Exhibit title _____

Exhibitor _____ Age _____

3 Exhibit title _____

Exhibitor _____ Age _____

Checking regional Science and Technology exhibits

See the forms on the following two pages.

Science Exhibit _____

An exhibit selected predominately on science criteria should...

✔ Degree to which showing this attribute...

Strength		***Little or none***	
			Have a reasonable hypothesis which is being tested by a range of suitable experiments (realistic and likely to be encountered by the subject).
			Have acquired tested data, either from many observations, repeated experiments, calculation or computer modelling/simulation, and should include an in-depth analysis of the data gained.
			Have tested by experimentation any 'data' gained from computer modelling/ simulation. Any computer use should clearly enhance the investigation and not be more appropriate at a programming or presentation competition.
			Explore the topic in depth, especially by investigating the mechanism of 'how' the phenomenon occurs rather than merely observing 'what' happens.
			Be carried out over the period of time required to give reliable results and to eliminate seasonal variations or transitory effects, as applicable.
			Be 'good science', especially in making sure that when data is obtained that the variables and possible sources of error are clearly identified and are controlled as much as possible and that as many replicates as practicable are used.
			Be well constructed and well displayed, with the display clearly "telling the story" of the research. Where video or computer displays are included they should effectively utilise their unique properties to enhance communication.
			Have an in-depth explanation of the topic being investigated, including research into what is already known about that topic.
			Be innovative, although innovation would not replace in-depth research exploring as many facets as practicable. Would include as much tested data and detail as possible should the exhibit challenge accepted principles.
			Include acknowledgment of all sources of information and assistance, providing evidence that the exhibitor was the originator of the idea being investigated or of the new or novel approaches taken.
			Include sufficient detail in the display and/or report booklet for the investigation to be replicated by a different person.
			Observe human and animal ethics requirements where appropriate.
			Demonstrate that the exhibitor has extensive knowledge and experience of their topic.
If scoring mostly in this range: send to the National Science and Technology Fair	*If scoring mostly in this range:* are better exhibits available?	*If scoring mostly in this range:* why select it?	

Recommendations

***Note**: The exhibit should have met the appropriate judging criteria. This checklist is merely a guide to help you review the quality of exhibits nominated for the National Fair to ensure that the most suitable from your region will be selected. It is obviously no indicator of an exhibit's success at that fair, nor should it be used for judging.*

Technology Exhibit_____

An exhibit selected predominately on technology criteria should...

✔ Degree to which showing this attribute...

Strength		***Little or none***	
			Show and verify the need or opportunity for the product, process or environment developed by the exhibitor. In addition, should have clearly defined the dimensions of the problem causing a need for their 'solution'.
			List performance criteria identified from need for the product, process or environment by the targeted end-users. Does it actually work?
			Show extensive research into solutions which already exist and have evaluated them and identified their shortcomings in relation to the original need/ opportunity; demonstrate and/or prove originality or advancement in their 'solution'.
			Show that the end-users' needs and responses are key factors in guiding the development of the product, process or environment.
			Include sufficient documentation (plans, models, etc.) to verify the development process of the product, process or environment, with the criteria and data used for design decisions identified and reasons for improvements included.
			Include research aimed at improving the performance of the product, process or environment during its development cycles. Where objective data has been gathered the methods of science would be most appropriate.
			Show clearly that at each stage of development the performance was evaluated against criteria important to the end-users, and against technological aspects such as: efficiency, optimum performance, reliability, cost-effectiveness, economy, safety/fail-safe, appropriate materials, working life, mean time between failure, ease of use, ergonomics, aesthetics, suiting the abilities of a range of users, range of working environments, etc.
			Include a consideration of the suitability of the product, process or environment for mass production (where appropriate), including a consideration of the suitability of the design for a high level of durability, construction and finish (where appropriate) as expected by end-users. However, there is no expectation that it should be in final form for the purpose of the fair—which focuses on development.
			Include acknowledgement of all sources of information and assistance, providing evidence that the exhibitor was the originator of the idea or improvements in the 'solution' they have developed.
			Observed appropriate human ethics procedures during development when involving people in testing the appropriateness of the 'solution' they have developed.
			Demonstrate that the exhibitor has extensive knowledge and experience of their topic.

If scoring mostly in this range: send to the National Science and Technology Fair	*If scoring mostly in this range:* are better exhibits available?	*If scoring mostly in this range:* why select it?

Recommendations

***Note**: The exhibit should have met the appropriate judging criteria. This checklist is merely a guide to help you review the quality of exhibits nominated for the National Fair to ensure that the most suitable from your region will be selected. It is obviously no indicator of an exhibit's success at that fair, nor should it be used for judging.*

Section 2

Judging issues

Judges at the National Fair are faced with resolving issues that the diversity of awards at a regional fair usually manages to avoid. The most obvious are:

1 **Age:** With an age range of 11–18 years, some allowance will be made for the range of age-related capabilities likely to be present. In each area of judging (thought and understanding/researching the need, innovation and originality, thoroughness, development, presentation, etc.), the final result must be placed in the context of the age (and thus experience, maturity, manipulative skills, etc.) of the exhibitor. For example, some considerations would be: 'Is this exhibit realistic for a 12 year-old?' 'What more would you reasonably expect a 17 year-old to have done?' However, you must still be satisfied with the quality of the exhibit regardless of age.

Examples of application of some criteria by increasing age

Gathering of data/ of development process	more replication, wider range experiments, more information gathered/depth of involvement
Treatment of data/ information	more variables identified and controlled, more statistical analysis
Record keeping tion	greater detail of documenta-
Level of originality	greater depth of originality

2 **Pair v. individual:** Expectations would be higher with two people working on a project, although the judges are aware that the logistics of group organisation and development of team skills impose their own problems. With two exhibitors, judges would expect more effort, especially in terms of numbers of experiments, samples or field observations, the detail in recording and displaying data, the time involved in construction or display aspects of the project, etc. Judges will be looking for evidence of team work and of synergy, where the exhibit is better than either of the team could have produced individually. Team exhibitors will need to be aware that some awards make provision for only one person to receive it.

3 **Presentation:** This becomes an issue where the form of presentation in effect becomes the exhibit, usually where the exhibit has become a computer presentation or simulation. In this instance, regional judges should assess whether the exhibit would be more appropriate in a computer presentation or graphics competition. The form of presentation must be appropriate to the type of exhibit and to the demands of public exhibition.

Presentation is not an end in itself and is not awarded at national level. Its inclusion in the judging criteria is mainly to remind exhibitors that effective communication of the essentials of their work is an important element: important discoveries not communicated will ultimately be of little significance. Note that good presentation of poor science or technology is not wanted! See page 19 for more detail on presentation.

It is useful if exhibitors have detailed accounts of their methods and results in a data folder, but the display must summarise all the salient points of the investigation and not require an interested observer to read the folder to gain an overview of the exhibit.

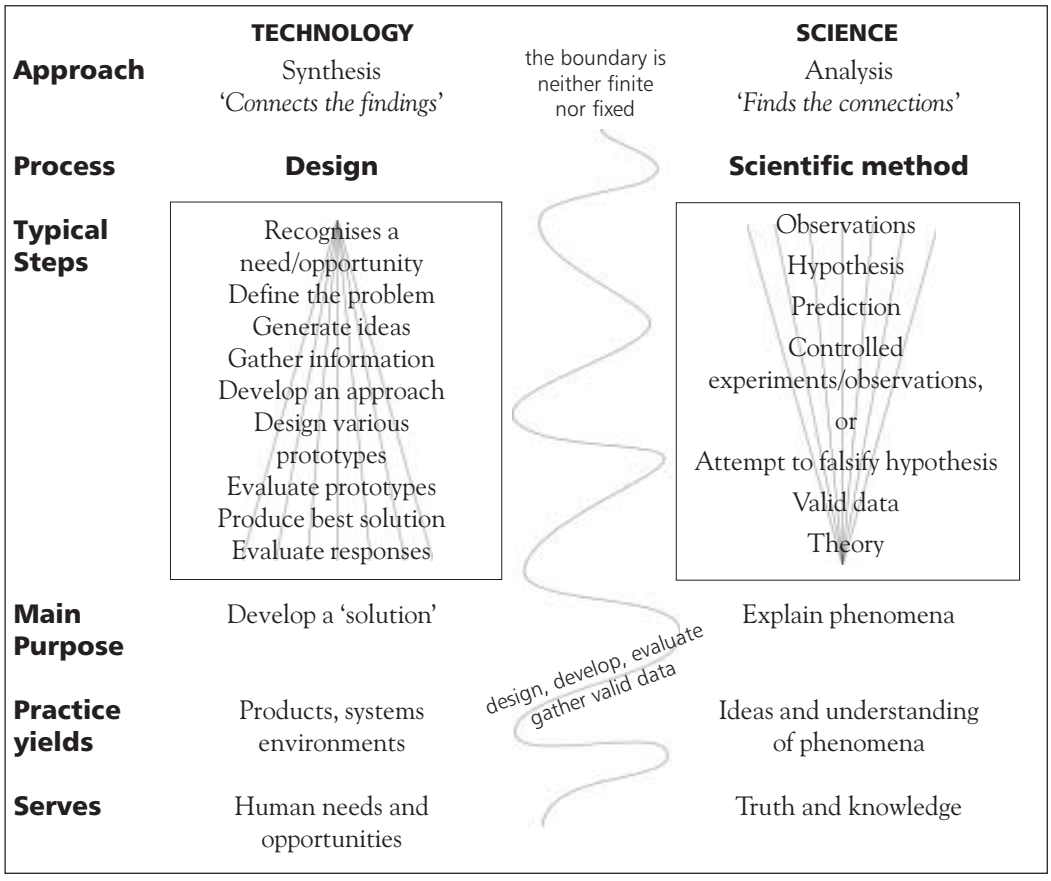
4 **Exhibit size:** The size of exhibits at the National Fair should be restricted to a maximum of 1.2 m wide, 0.75 m deep and 1.5 m high (but 1.2 m is preferred). The reasons for the restrictions are the limitations of space, the need for an exhibit to travel, similar constraints at overseas fairs should the exhibit be selected for overseas exhibition, and the requirements for effective display.

5 **Access to information:** Exhibitors are expected to have investigated previous work in their topic. To a large extent, this may depend on the location and personal circumstances of exhibitors: those with ready access to universities or to scientists at nearby research organisations, or whose family members work in science or technology related fields, will have a greater advantage, as will those whose family circumstances allow ready access to on-line resources. The issue for judges is whether exhibitors have done all they could reasonably be expected to do within their circumstances. Likewise, judges should be aware of unintentionally penalising exhibitors advantaged by their location or family connections, by expecting more from them. However, for technology exhibits it could be as simple as a visit to their nearest hardware store!

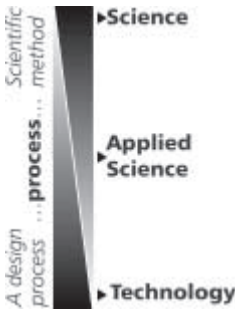
6 **Distinguishing technology and science:** This is summarised in the diagram below, where technology is shown as a discipline distinguished by its own purpose, process, knowledge, outcomes, and body of practice. The view that 'science leads, technology follows' is historically inaccurate and acknowledges neither the place of science nor technology in human endeavour. Technology is not merely applied science.

This model is deliberately simplistic, justified by the need to provide an easily understood and applied model.

The criteria by which exhibits will be judged are congruent with this model. Exhibits may be judged on both science and technology criteria; particular awards will depend on which criteria predominate.



7 **Diversity of exhibits and the science, applied science and technology continuum:** The diversity of exhibits poses problems for the judging panel. In a Science and Technology Fair, exhibits should fit somewhere on this continuum, summarised in the somewhat simplistic diagram below. Judging criteria are given only for science and technology; those in the 'middle' can use relevant criteria from both groups; such exhibits can be matched to awards in either category.

Exhibit Continuum	Exhibitors would show how they have...	Exhibit purpose
	Acquire reliable data through experimentation and/or observation. *(Creation of new knowledge)*	**Serves truth & knowledge**
	Shown the results and/or benefits of applying the knowledge to selected situations. *(Application of science knowledge to new or existing situations)*	**Application of science knowledge in solutions to problems or improvements to existing solutions**
	Shown how the need or opportunity was identified, developed a solution, measured the degreee to which it met the original need or opportunity. (Development of a new and/or modified product, system or environment in response to an identified need or opportunity)	**Serves human need or opportunity, drawing from a wide range of disciplines (including science) in developing solutions**

While the judging sheets list key categories of judging criteria in science and in technology, they can obviously not cover the entire spectrum of qualities likely to be present. Exhibits can be compared on their originality, depth of investigation or development, technical skill, presentation, and so on, but assigning scores in each of these to produce a 'grand total' score is useful only in the early stages of judging as a tentative guide to sorting exhibits into "to be considered for an award" and "not award standard" groups (with the emphasis on 'tentative'). Ultimately, the judging panel has to decide if an exhibit is "good science", "good applied science" or "good technology" and scores on a judging sheet can only be used as an indicator to exhibits deserving closer scrutiny. The experience and competency that judges bring from their respective communities of practice in science and technology is crucial at this stage.

Judges will apply criteria from both judging sheets where most appropriate, regardless of the criteria which may have used to select the exhibit at regional level. Whatever the exhibit, judges are looking for quality in all aspects of the work carried out.

A Science Fair exhibit should have gathered data of some form and may also attempt to identify a key principle from the mass of data gathered; a technology exhibit should begin with an identified need or opportunity and will probably encompass a wide range of other disciplines in the development of the best 'solution'. At the national level, a technology exhibit would need to show how it was developed (within the exhibitor's constraints) to best meet the identified need or opportunity.

8 **Defining technology exhibits:** As technology is a recent inclusion in the Genesis Energy National Science and Technology Fair, the characteristics of a technology exhibit suitable for this fair are described below in more detail.

A **technology exhibit** for the Genesis Energy National Science and Technology Fair is defined as one where the **development** of a useful product, device, process or environment in response to an identified need or opportunity was the primary goal of the exhibitor. Data gathered would be for the purpose of determining the characteristics, design, configuration or operating parameters for optimum performance in relation to the original need or opportunity, rather than for the acquisition of knowledge about phenomena, materials or actions leading to further elucidation of the 'truth' about them (which would be more appropriate in a science exhibit).

The development should be driven by identifiable needs or opportunities, as unlike science which exists to serve truth, technology exists to serve human need. The exhibitor would be expected to demonstrate the validity of the original need or opportunity and to show how their solution was better or more innovative than existing solutions.

The curriculum statement: *Technology in the NZ Curriculum*, is rightly inclusive in its definition of technology, but for the purpose of exhibiting in an Genesis Energy Science and Technology Fair, the **development** of a product, process or environment should be the focus. This allows an evaluation of measurements of performance and subsequent development of the various prototypes leading to the 'final solution' exhibited.

Exhibits primarily of a high level of craft skills (such as furniture, baking, presentations) are better suited to other relevant existing competitions for these areas. However, the development of a new product (such as a new food product or new household utensil) would be ideal as a Science and Technology Fair exhibit.

Product testing (e.g. efficacy of bleaches) is a common classroom science activity, but would be suitable as a Science and Technology Fair exhibit only where a new or more efficient method of testing was developed, rather than merely applying existing techniques.

9 **Matching judging criteria to an exhibit:** Where there may be some doubt as to whether an exhibit is mostly science or mostly technology, the brief checklist below may be of use. The technology criteria are those that exhibitors will become increasingly familiar with as the Technology curriculum becomes more widely implemented over the next few years.

Tick only the 'Yes' boxes and add up the ticks to determine whether to judge the exhibit on science or technology criteria. Where an exhibit has both science and technology criteria a 'middle' set of boxes has been provided.

Identifying exhibits as science or technology

✔ the 'Yes' box, or the 'Diamond' box inbetween Science and Technology.
(See note below the table)

	Science	either	Technology
Rather than meeting a human need of opportunity, is the exhibit primarily driven by curiosity about something?	Yes ☐	◇	No
Is the exhibit a response to an hypothesis?	Yes ☐	◇	No
Is the exhibit a response to an identified human need or opportunity for a product, process or envirnoment?	No	◇	Yes ☐
Was some of the research aimed at confirming the validity of the original need or opportunity, and/or finding out the precise nature of the problem to which they are developing a solution?	No	◇	Yes ☐
Was most of the research aimed at gathering new data in response to an observation and/or hypothesis?	Yes ☐	◇	No
Did the gathering and processing of data ensure its validy and aim to determine its significance to causes of an effect?	Yes ☐	◇	No
Was much of the research aimed at guiding the development and/or improving the performance of the product, process or environment?	No	◇	Yes ☐
Is scientific method the core process?	Yes ☐	◇	No
Is the design process the core process?	No	◇	Yes ☐
Does the exhibit identify as important such attributes as: efficiency, optimisation, reliability, cost-effectiveness, appropriateness of materials, ergonomics, aesthetics, etc?	No	◇	Yes ☐
Does the exhibit show that the satisfaction of the end-users of a product, process or environment was a key factor in guiding the development?	No	◇	Yes ☐
Is it concerned with something that could be mass-produced?	No	◇	Yes ☐
Has an attempt been made to falsify an hypothesis?	Yes ☐	◇	No
Has a theory been formulated to explain the observations?	Yes ☐	◇	No
Is the **development** of the identified product, process or environment, the key element of the exhibit, including documentation with sufficient plans, models etc, to verify the development process?	No	◇	Yes ☐
Totals			

The centre column indicates exhibits that could be regarded as either technology or science exhibits.

Total the ticks

Judging procedures

Judges

Judging panel: The composition of the judging panel is aimed to provide continuity and to maintain the highest standards of judging. Some experienced members of the judging panel are appointed for a term of several years in order to provide continuity of experience; these constitute the core National Panel. One member of this core National Panel is replaced annually. Others are appointed for one fair. A proportion of regional chief judges are invited on to the judging panel each year in order to familiarise them with national judging standards.

Chief judge: Responsible for defining the judging criteria and procedures, publishing these for the judging panel and for regional fair judges, appointing panel judges, discussing with the panel judges the judging criteria and procedures, preparing the judging timetable, directing, advising and assisting judges as required, monitoring the judging procedures and process, chairing the meetings of the judging panel to arrive at a consensus, advising the Genesis Energy Science and Technology Fair Manager of award recipients. The chief judge is appointed for a term of three or four years, with the next chief judge appointed in time to act as deputy chief judge in the final year of appointment.

Judging Procedures

Prior to regional fairs: The chief judge will have prepared this Judging Handbook before the first regional fair and ensured it reaches all regional chief judges.

Evening prior to judging: Any documentation in addition to the Judging Handbook will have been prepared and given to the judging panel. The judging panel meet for their briefing the evening before judging begins, and this will also provide an opportunity for them to become familiar with the exhibits before meeting the exhibitors. During this session judges raise any issues for group discussion and the chief judge will comment on problems which may arise. Judges are matched in pairs in their areas of expertise and are, if possible, matched to exhibits (e.g. judges with a technology background are matched to technology exhibits; judges experienced in how younger exhibitors work matched to such exhibits, etc.). The exhibitors will have set up their exhibits so they are ready the next morning for judging to begin.

Day 1, morning: Exhibitors assemble for their briefing in the morning where the Judging Panel are introduced, the procedures described and the judging timetable given out. The judging procedure has four major components:

- ***Introduction to exhibitors:*** Each judge spends 10 minutes individually with exhibitors at three exhibits, which are not those they will be looking at in detail later. The intention is to give judges an appreciation of a wider range of exhibits and to meet more exhibitors.
- ***Team interviewing:*** Judges work in pairs to interview the exhibitors according to a strict judging timetable, which allows at least 25 minutes per exhibit. Judges spend about 15 minutes interviewing an exhibitor, using the remaining time to document the exhibit's features, record their assessments and make recommendations for one of two categories: 'not award standard' or 'consider for an award'. The exhibit timetable aims to match the specialist areas of judges where possible and to avoid having judging teams interviewing adjacent exhibitors at the same time. Each pair of judges will probably judge 5–6 exhibits.

Afternoon: Exhibitors are free for other activities. The judging panel splits into two teams which independently examine all the exhibits again. One of each pair from the 'morning' judging teams is in each 'afternoon' team.

- ***Team judging:*** The task of each judge in these teams is to briefly describe to the other judges the key features of the exhibits they examined in the morning and to act as an advocate for these exhibits, to justify their recommendations and receive comments from the other judges. While it is expected that most time would be spent on exhibits recommended for awards, all exhibits must be examined and reasons given for their categorisation. Each team then takes cards with the exhibit names and numbers and arranges them in their rank order for science and technology exhibits. There is no attempt to match awards to exhibits at this stage.
- ***Award allocation:*** All the judging panel meet, chaired by the chief judge. Each team first presents their rank order. Any marked differences are discussed, exhibits being revisited by the whole panel if necessary. Awards are then allocated, using the criteria from the award citations, the rank of the award, and if relevant, the age and perhaps personal attributes of the exhibitor. Any problems in allocating awards are noted. The meeting continues until all are satisfied with the awards, although there is provision for the chief judge and other judges to re-examine the exhibits and award allocation the following day should there be any reservations as to the suitability of any award. Judging and award allocation requires balancing many diverse objective and subjective criteria. There will be times when it may not be obvious to a casual observer why an exhibit has gained a particular award. The judging panel reserve the right to not give an award should they decide that no exhibits meet the required standard.

Day 2: The chief judge receives comments from the judging panel on individual exhibits and may re-examine any exhibits if not satisfied. While the chief judge is ultimately responsible for the judging, he or she does not have the authority to later change awards without consulting the judging panel or previously agreed representatives of the judging panel.

The chief judge is responsible for checking the accuracy of the transfer of awards to the appropriate certificates and plaques and in press releases.

Awards are presented at the **Award Presentation** ceremony.

Records required from the judging panel

Comments are required from the judging panel:

(a) Background comment for each exhibit to be used by the chief judge when presenting awards. Please note any interesting aspects of the project. These may also contribute to a special award—such as 'for the most ambitious project', 'greatest number of problems overcome', 'most informative display'—where the exhibit quality is unique and such that recognition is required. Higher award winners receive added mention.

(b) A paragraph suitable for inclusion in a letter from the chief judge to each exhibitor. Where two exhibitors are involved in a project, please try to make comments for each which are unique to them. The letter includes constructive and encouraging comments and is feedback to the exhibitor from the judging team and also something tangible to take back to school and to include in a curriculum vitae.

Section 3

Judging criteria

This section describes a range of judging criteria in detail, whereas the judging sheets have only the more discriminating criteria.

First, decide whether to use predominately science or technology criteria; see the checklist on page 12. However, the assumption is that exhibits will fall somewhere on the science–technology continuum and a mix of science and technology criteria may be appropriate for some exhibits.

The criteria on the judging sheets are in two sections: those unique to science or to technology, and those applicable to both. For example, the categories of Thoroughness, Technical skills and Presentation are largely applicable to all exhibits. Implicit in these categories are the use of information technologies in acquiring, processing and displaying information, the application of design principles, technical skills, and presentation techniques.

The categories of criteria on each judging sheet are listed in rank order, from most to least important, although elements within categories are not necessarily in rank order.

The criteria detailed below are also in rank order within their categories. For example, although the focus of a technology exhibit would need to originate with an identified need or opportunity, the *development* of the 'solution' is the most important element of a technology exhibit.

Although judging criteria can be listed in detail, as below, it is the experience and competency that judges bring from their respective communities of practice in science and in technology which ultimately determine the allocation of awards.

Science judging criteria

The focus is usually on validating experiments which lead to the gathering of data to prove or disprove the hypothesis or to further investigate an aim or seek answers to questions.

In an hypothesis, identify the cause and expected effect.

Validating tests should reproducibly (through replication) show some of the following:

(a) When the cause was present, the effect resulted.

(b) If the cause was not present, the effect did not happen.

(c) The effect did not arise from causes other than that stated in the hypothesis.

(d) If the cause was transferred to other systems, the same effect resulted.

The tests should relate to the hypothesis (or aim of the study). The tests should not go beyond the hypothesised cause to produce the effect.

Judgements about the novelty (originality, importance, significance, etc.) of the exhibit are less valid as these can not be applied as rigorously.

Scientific thought and understanding

A science exhibit should show evidence of appreciation for accuracy of observation, measurement, presentation of data and reporting, along with an understanding of the underlying or related scientific principles embraced within the project.

Scientific thought and understanding may be demonstrated in a project by some of the following:

- clear statements of intent;
- an effective plan and timetable;
- good experimental design with controls;
- clear description of methods and equipment used;
- variety in the way resources are used, measurements and data are gathered;
- replication as required for an appropriate level of accuracy;
- effective presentation of data e.g. graphs, tables, etc.;
- an understanding of any computer program used in data generation or processing;
- proof that data reproducibility is statistically valid and/or recognition of limitations;
- identification of variables and sources of error;
- sound conclusions related to the observations and data presented;
- discussions of significance of the findings to other situations;
- recognition of any wider implications of the study.

Originality

There is evidence of originality in the selection of a topic or statement of the problem; uniqueness of approach; resourcefulness in obtaining, handling and interpreting data; ingenious use of equipment and materials; creative displays or use of illustrative objects; inventive apparatus; insightful conclusions; inspired applications of the principle, process or product.

An original and creative project is one which:

- investigates a subject not previously studied in that area, explores a different aspect of a traditional topic or employs novel approaches to a common theme;
- documents changes or new phenomena over a period of time;
- sets up one or more experiments, surveys or trials, each with an original hypothesis or imaginative basis;
- uses novel methods, alternative approaches or new strategies in the investigation;
- displays resourceful use of materials, original choice of examples or innovative selection of situations for study;
- extends the use of any equipment, apparatus or technique far beyond its usual application;
- portrays observations, measurements, results or other data in imaginative ways;
- recognises an opportunity for a novel or unusual application of the information gathered;
- reaches an interesting conclusion, displays a perceptive summary or presents a fresh view of the situation being studied.

Exhibitors are expected, within the constraints of the resources they have readily available, to have investigated work previously done by others and to show evidence supporting elements they identify as original.

Technology judging criteria

Definition of technology exhibits

This is described in more detail in point 8 on page 10. In summary, a technology exhibit is one where the **development** of a useful product, device, process or environment was the primary goal of the exhibitor. The development should be driven by identifiable needs, as unlike science which exists to serve truth, technology exists to serve human need. Data gathered would be for the purpose of determining the characteristics, design, configuration or operating parameters for optimum performance. However, the product, system or environment which was developed should work!

Development

'Development' is a key concept in technology, as shown by the history of most of the 'technologies' we use today, and in what we expect to be developed in the future. The process of development is related to an identified need or opportunity.

A project showing the development of a product, process or environment would:

- include sufficient documentation (plans, models, notes, etc.) to verify the development process of the 'solution';
- show that at each stage of development the performance (of the various prototypes) was evaluated by valid tests against criteria important to the intended end-users;
- have a range of technological aspects which were measured or estimated; for example:
  - efficiency
  - optimisation
  - reliability
  - economy of operation (including energy efficiency)
  - safety, including fail-safe features
  - safe performance 'envelope'
  - working life / MTBF (Mean Time Between Failure)
  - cost-effectiveness
  - use of most appropriate materials (especially in relation to its working environment)
  - environmental 'soundness'—that its development, future production and/or disposal would not cause environmental damage or long-term degradation
  - working environment range
  - ease of use (by users with a range of abilities)
  - ergonomics
  - aesthetics … etc.;
- use specialist assistance where appropriate, with acknowledgement.

Innovation and originality

Inventiveness, innovation and originality can apply equally to improving existing 'solutions' as to new 'solutions'. In technology, most advance is due to further development of existing 'solutions' and this must be expected in a Science and Technology Fair situation.

A project showing technological innovation and/or originality is one where:

- the characteristics and shortcomings of existing 'solutions' are clearly identified;
- shortcomings of existing 'solutions' and/or identified needs are met in innovative or original ways, with clear evidence they are truly innovative or original;
- materials and/or processes are used in new or more efficient methods to achieve the 'solution'.

Identifying and researching the need

Technology serves human need, so any technology-based exhibit should begin with an identifiable valid need (or opportunity). As any technology exists for people, then their needs and expectations in this context need to be identified and used to determine the performance specifications of the 'solution' being developed.

A technology project identifying and researching the needs for the product, process or environment is one which:

- shows how the need or opportunity was identified and then investigates the validity of the identification process;
- clearly defined the need or opportunity with reference to the end-users' expectations;
- has extensive investigation into existing 'solutions' and identified their shortcomings in relation to the identified need or opportunity;
- analysed all the information gained, in relation to the need, opportunity and existing solutions;
- defined performance specifications from an analysis of the needs and expectations of the end-users.

Evaluating the 'solution' (product/process/environment)

As there is no technology without human need, the 'solution' must be judged against the original need or opportunity.

When evaluating the product, the exhibitor would:

- measure how well the 'solution' works in relation to its defined performance specifications (functionality);
- measure how well it meets the needs of the users through appropriate tests;
- show how the end-users were taken into account at all phases of development;
- provide evidence that intended users would find it easy to use (user friendly) and that it would meet their needs efficiently;
- have investigated whether the intended users would be likely to enjoy using it, if appropriate;
- consider the ergonomic requirements of the range of people (age, gender, size, etc.) likely to use it;
- either show its potential to be aesthetically pleasing, or make it aesthetically pleasing;
- consider the potential for mass production or for disseminating it more widely, especially identifying key quality control elements.

Shared judging criteria

As with the criteria above, not all elements described here may apply exactly to all exhibits, but the concepts of depth of treatment and effective presentation can be assessed for all exhibits.

Thoroughness

The thoroughness of work (and thus effort) which has gone into an exhibit is reflected in the scope of the topic, the scale of the investigation, the detail obtained, the extent of the results, the repetition of experiments, measurements or observations, the construction of the exhibit and its illustrative items, written material and other displays. As with all criteria, these must be related to the age of the exhibitor, the resources and facilities available to them, and in some cases, to the topic itself.

An exhibit reflecting a thorough approach is one which:

- investigates all (reasonable) aspects, both positive and negative, of the problem;
- places the topic in the context of other work;
- specifies and acknowledges all help received in designing the project and all sources of information in: conducting experiments, fieldwork, measurement, construction of the exhibit itself, preparing photographs, typing, photocopying, diagrams etc., or with ideas and suggestions;
- identifies the results of previous research and/or practice, revealed by reading around the topic or by conducting interviews;
- cites literature searched and all sources of supporting data;
- identifies sources of error and eliminates or makes allowances for them;
- carries out repeated experiments, field studies, measurements or other investigations over an appropriate period of time, in many different situations, with numerous examples, or with a variety of variables;
- repeats all observations, measurements or readings until consistent accuracy is obtained;
- keeps detailed and methodical records, and offers these in a log book or diary;
- makes an exhaustive and detailed analysis (including tests of significance) and portrayal of the results and data obtained;
- exhibits close attention to detail in the construction and presentation of the project: graphics, lettering, models, displays etc.

Technical skills

Items required for the project have been assembled with skill and dexterity; equipment, models and structure of the exhibit have been well constructed; graphic materials have been carefully prepared and presented; living plants and animals have been well cared for; working parts are reliable; and the whole is well planned and neatly finished.

A project displaying technical skill is one which:

- shows a high level of technical skill in the making and/or assembly of the various parts of the project;
- has models, apparatus, equipment or display items well designed, soundly constructed and assembled;
- the equipment, apparatus, audiovisual aids etc. continue to function reliably and well for the duration of the Fair;
- displays skills in accurate measurement, observation, devising experiments, field investigations, computation, and design;
- the exhibitor used their own skills throughout the key aspects of the project rather than working under expert supervision;

- exhibits skilful and knowledgeable use and application of scientific and/or technological techniques or equipment;
- the health and wellbeing of the plants and animals on display show a skill in raising plants, handling animals and caring for living things;
- technical skills are reflected in the quality of photographs, drawing and/or map detail, particular graphic skills;
- tools suitable for the most efficient carrying out of tasks have been selected and used with competence, for example, spreadsheets for analysing and/or presenting numerical data, range of machine tools (as appropriate to their age) when fashioning devices, etc.

Presentation

The exhibit is well designed and developed to be attractive, visually interesting, informative on all aspects of the investigation; well illustrated with photographs, models, specimens or samples; and with wide public appeal and effective communication.

A well presented project is one in which:

- the title is clear, and the exhibit attracts attention by its presentation;
- the purpose of the project is clearly explained in simple terms readily understood by viewers of all ages, has a logical sequence, is clear and effective, with strong public appeal;
- the methods used are set out clearly and concisely but with sufficient detail for others to follow;
- supporting material (development log, field notes, experimental record, data notebook) is well organised and neatly presented;
- illustrative items such as photographs, diagrams, models, specimens, samples and living materials are displayed appropriately to make the project both visually exciting and more informative;
- all observations and data are clearly expressed as tables, graphs, charts etc., or summarised in other ways so that viewers are quickly able to see the results of the investigation, experiment or measurement;
- clearly sets out the overall findings and conclusions;
- care is taken with the selection, quantity and quality of written expression;
- achieves visual impact by effective and balanced use of colour, lettering, illustrative items and layout, and using the available space to advantage;
- the display headings, lettering, photographs, diagrams, drawings, charts, tables, graphs and descriptive materials are carefully executed, neat, attractive and well presented;
- all pertinent details of the exhibit are displayed and communicated in a way which enables viewers to quickly grasp the essentials of the exhibit;
- video and computer equipment where used is an integral part of the project (rather than being used or included for their own sake) and may be used to present much of the above;
- an effort has been made to attract and inform with high levels of relevance and human interest;
- in a team exhibit, effective teamwork has contributed to its high quality;
- oral presentation in the interview should clarify and amplify the exhibit through explanation, discussion and description and show that the exhibitor has complete understanding and full appreciation of the purpose and detail of the project.

Genesis Energy National Science and Technology Fair

Judging Form

● Science

Scale: N/A 1 2 3 *(highest)*

Project Title _____

Exhibit Number _____

Exhibitor/s _____

Initial Recommendation ☐ Award ☐ No award

Scientific thought & understanding

Question identified/hypothesis stated	
Cause and effect identified/prediction	
Experiments, survey devised - methods	
- variables/errors/accuracy	
- results/data	
Records - analysis, presentation	
Conclusions	
Significance/discussion	
Explain principles	
Other (e.g. computer program)	

Comments

Originality

Evidence for originality/innovation	
New observations	
Other	

Common criteria

Knowledge Base

Thoroughness

All reasonable aspects investigated	
Previous work investigated	
Detailed records	
Analysis in depth/detailed	
Assistance documented	
Other	

Technical skills

Design, construction	
Reliability of operation	
Use of instruments/tools	
Has requisite skills	
Other	

Presentation

Clarity of presentation	
Selectivity in presentation	
Graphic communication	
Public appeal	
Oral presentation; teamwork	
Other	

Genesis Energy National Science and Technology Fair

Judging Form

● Technology

Scale: N/A 1 2 3 *(highest*

Project Title _____

Exhibit Number _____

Exhibitors _____

Initial Recommendation ☐ Award ☐ No award

Development

		Comments
Documentation of development		
Performance evaluation		
Appropriate technological aspects, e.g		
- efficiency/optimisation		
- reliability/working life		
- safety/fail-safe/operation		
- appropriate materials/processes		
- environmental soundness		
- ease of use/ergonomics/aesthetics		
- other		

Innovation and originality

Evidence of advance over existing		
Evidence of innovation/originality		

Identifying the need/opportunity

Need/opportunity clearly identified		
Identified shortcomings of existing		
Performance specs defined		

Evaluation

Relation to needs of users		
Evidence of meeting performance goals		
Potential for production		

Common criteria

Knowledge Base

Thoroughness

All reasonable aspects investigated		
Previous work investigated		
Detailed records		
Analysis in depth/detailed		
Assistance used, documented		
Other		

Technical skills

Design, construction		
Reliability/consistency of 'product'		
Use of instruments/tools		
Has requisite skills		
Other		

Presentation

Clarity of presentation		
Selectivity in presentation		
Graphic communication		
Public appeal		
Oral presentation; teamwork		
Other		

Section 4

Interviews

The opportunity for judges to talk with the exhibitors is a most important part of the Science and Technology Fair. It gives each exhibitor an opportunity to describe their work and to discuss it with the judges (usually senior teachers, academics and professional scientists). It also gives the judges insights into the exhibitor's design, development and especially their understanding of the project itself.

Essentially, however, the project must stand on its own; it must convey to the viewer the essentials of the particular investigation or development. The exhibitor will not always be on hand to explain, describe, or discuss any areas which are not stated or unclear. Thus the purpose of the interview is to interpret and explain as well as expand on details, and in particular to gain insights into how and why the exhibitor carried out elements of their project.

Following are some starter questions for both science and technology exhibits arranged in general categories, with particular applicability to science or technology exhibits indicated.

Getting started

What [science] observations or [technology] needs or opportunities made you choose this project?

'How did you come to make / design / investigate / develop … ?'

'How did you come to be interested in this topic? / Where did you get the idea for this project?'

'What more can you tell me about your [technology] researching the need / finding out about existing solutions / coming up with a new idea / developing your solution / checking that it has the qualities those who wanted it thought were important … ?'

'So, what did you [science] discover / [technology] decide to do?'

'How did you decide that your approach was sufficiently original or better than had been done previously to continue?'

Thought and understanding

'Tell me what you are trying to do here?'

'What more can you tell me about your [science] experiments / surveys / field observations / apparatus / equipment … ?'

'Now can you take me through [science] some of the results you obtained / [technology] development steps you carried out?'

'How did you identify and take into account possible sources of error?'

'How do you know that your data is reliable?' 'How do you know your results are significant?'

[technology] 'How did you decide what best met the need/opportunity you had identified?'

[technology] 'What were the major problems in developing your idea?'

'If you had more time what more would you have done?'

'What were the main findings [science] which helped you reach this conclusion / [technology] helped you decide your solution met the needs of the end-users?'

[technology] 'How are you sure your 'solution' meets the needs of your identified users?'

'What were the tricky bits of this project?'

'So, at the end, what did you decide?'

'Can you explain for me what would happen if …?'

Originality and innovation

'Did you have some help in designing the experiments / surveys / development steps … you have used here?'

'Have you seen this process / method / equipment … used in other ways?'

[Technology] 'What made you decide existing solutions weren't appropriate? What helped you come up with this solution?'

'What did you do to determine if someone had done this before?'

'Where did this equipment / material / display item … come from? Did you have help in setting it up?'

'Do you do anything on this topic at school?'

'Did you start out to investigate / develop … ? Did your ideas change? Are the results what you expected?'

'Why did you decide to display the results / development like this?'

'If you were going to take this project further what would you do?'

Development [technology]

'What problems did you have?' 'How did you recognise them?'

'Is the information in your log an account of all you did?' 'What else did you do?'

'What performance criteria were most important?' 'How did you measure them?'

'What tests/measurements did you do to see if your development was on the right track?'

'If it was to be mass produced, what further development do you think needs doing?'

Thoroughness

'When did you start working on this?'

'How many trips / experiments / surveys / design cycles / ... did you carry out?'

'How many times did you repeat [science] your experiment to get the method right / [technology] development steps / testing to check the outcome would meet the needs of end-users?'

'What sort of errors / problems did you find?'

[technology] 'Have you measured or estimated technological aspects such as: efficiency, optimisation, reliability (and/or mean time between failure), cost-effectiveness, appropriate materials, safety, ergonomics, aesthetics …'

'Did you have help with ... ?'

'Have you read around this subject to find what others ... ?'

'Where did you get some of the other data / information?'

'Did you talk to others about this project? Parents, teachers, family friends, scientists / technologists, others at school ... ?'

'What records did you keep while doing this project?'

Technical skill

'Tell me how these models / items of equipment / display materials ... came to be made?'

'What problems did you have?'

'Did you do the production work on this ... ?'

'Have you had any problems with this equipment?'

'Tell me about these plants / animals, are they easy to grow or have you had some losses?'

'Did you do this typing / word processing / illustrating / painting / layout … ?'

'Do you have a home workshop – does someone give you a hand?'

'Where did you learn to do this?'

'Did you devise / modify the computer program / peripherals yourself?'

[technology] 'Did you make this yourself?'

Presentation

'Are you pleased with the way it looks today?' 'Why did you arrange it this way?'

'Is everything as it should be?' 'Nothing broken, damaged, spoilt on the way here?'

'Are you happy with the layout here? Why / why not?'

'Are you the photographer / artist?'

(The presentation of the project should speak for itself!)

Feedback to exhibitors

In addition to seeking to determine the extent to which the exhibitor understands the project, their depth of knowledge about it, the methods used, the underlying scientific principles and the significance or applications of the results, and elements of technological practice—the interview should be supportive of the efforts made and give a positive feedback to the exhibitor. Some gentle suggestions for improvement: *'Had you thought of?' 'You might like to look at some of the other projects to see how ...'*, etc. are appropriate, but should not be a major element in the interview.

Similarly, some positive feedback can be given by discussing the wider issues of the project, other applications, related or more distant examples, previous attempts, current research/developments in universities, CRIs, SOEs, hospitals, industry..., or by mentioning people engaged in similar work or interested in such an area of study. Each exhibitor should be made to feel that their project is of interest and value and has made a significant contribution to our collective information base. In short, they are a real scientist or technologist with a real sense of achievement.

Personal qualities

The other important role of the interview is to think of the personal qualities of the exhibitor as if they were exhibiting at an overseas fair as our ambassador. Some qualities you may wish to be conscious of are:

- maturity, self confidence, assurance …
- fluency, descriptive ability, level of detail ...
- relation to others, adaptability, tolerance ...
- ability to speak with individuals, to a group, to all ages ...
- ability to relax, to observe, to listen ...
- interest, awareness ...
- enthusiasm, energy, initiative ...
- responsibility, reliability, punctuality ...
- courtesy, politeness ...
- bearing, dress sense ...

It will not be possible during the interview to note these qualities and this should not be attempted. Personal qualities should in no way influence the judging of their project which, as mentioned above, must stand on its own. Given the high calibre of exhibitors it is unlikely that this category will be used to finally decide some awards, but you should be aware of it.

Conclusion

The judging interview should end as it began, on a warm human note.

'Are you enjoying your visit?'

'Did you have a good trip down?'

'Have you travelled on your own before?'

'How is your billet / accommodation; are they looking after you?'

'Looking forward to the trip / activity this afternoon?'

'Do you hope to be at another National Science and Technology Fair?'

Section 5

Awards

Awards will be announced each year prior to the Genesis Energy National Science and Technology Fair. As this Judging Handbook is circulated early in the year it would be inappropriate to include a list of awards because details have yet to be confirmed.

In 2002 there will be equivalent awards for science and technology, with a further group of generic awards for excellence in either science or technology.

The **Premier Awards** in both science and technology are sponsored by **Genesis Energy** and include overseas travel to an international event.

Genesis Energy also sponsors two $2000 tertiary education scholarships.

IPENZ sponsor an equivalent one for technology, with travel to the Asia-Pacific Invention Exhibition.

Other awards to the value of $1000 include local travel and tertiary scholarships. **Merit Certificate Awards** may also be nominated by the judges.