



Engagement Proposal

The Technical Textiles & Nonwoven Association is seeking expressions of interest from companies that may wish to participate in the Australian Fibre & Textile Environmental and Recycling Cooperative Research Centre (AFTER-CRC)

The Purpose

To conduct research and develop new technologies, products and intellectual property in the fields of fibrous waste, waste mitigation, and fibre and material recycling and to develop and exploit commercial opportunities from these outcomes.

Fields of Research

- Technologies for waste mitigation in manufacture
- Fibres and polymers for sustainable manufacture
- New products from waste
- Recycling and regeneration technologies; and
- Solutions for product stewardship.

The Opportunity

- Head start access to frontier technology and a new industry.
- Intellectual property licensing opportunities (first-right-of-refusal to exclusive licences in defined fields).
- Priority access and publication approval rights to commercial-in-confidence research results.
- Reduced cost of fibrous inputs
- First ever Australian textile CRC
- Key focus on triple bottom line social responsibilities.

Financial Benefits

- Leverage of committed funds - at least 4 to 1
- Pro rata equity in AFTER CRC Intellectual Property Management & Trust Company
- Generous Australian tax concessions for R&D expenditure

Nature of support expected

- Nominal cash involvement – AUD \$0.20 - 1.0 million per annum, amount to be determined by breadth of desired participation and intellectual property rights
- In-kind contributions, at least equivalent to cash value, to be negotiated

Commitment

- 5 years, performance-based; provision for exit included.

Proposed Research Institutions in the AFTER CRC

Note: the research is conducted by and in conjunction with the research institutions. CRC funding contributes to the discounted cost of research staff. Additional research staff can also be employed through CRC funds.

Components of the research may also be performed by staff employed by CRC partners as an assessable in-kind contribution.

- CSIRO Materials Science and Engineering
- Deakin University Centre for Material and Fibre Innovation
- RMIT University

Structure and Governance:

- Unincorporated joint venture with independent management and trust company; company holds Centre Intellectual Property. Two agreements, one between the CRC company and the Commonwealth of Australia and one between AFTER CRC partners delineate governance, modus operandi and obligations of the venture.
- Commercial partners with intellectual property rights in non-competing fields – new technologies, new cost effective inputs.

Timeline

- Period Activity Requirement

Stage 1	By end June 2010	Application for the CRC, incorporating a market assessment, financial analysis, proposed governance structure and research program submitted.
Stage 2	July to August 2010	Application Participants' Declarations – to pledge contributions agreed to in Application
Stage 3	Nov/Dec 2010	Interviews with Participant Delegates on AFTER CRC interview panel if required (Canberra)
	October 2010	Research Plans finalised Participants to assist preparing Plans as required
	December 2010	Outcome announced
	January 2011 to June 2011	Negotiation and execution of Participants' Agreement.
Stage 4	1 July 2011	Operations to commence
	1 July11	First cash payment due

Science teaches us that matter and energy are not destroyed, they merely change state. Waste contains significant amounts of valuable resources that were once used as a raw material, and that can be recovered and used over.

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The facts

Fibrous inputs are the TCF industry's greatest overhead, and yet:

- Approximately 1 million tonnes of fibrous waste is buried in Australian landfills every year;
- Whilst burying textile waste, Australian industries also import fibrous waste for new products;
- Fibrous waste is an unrealised source of valuable raw materials and new products; and
- The regulatory environment is poised to tighten and fees around landfill are likely to become prohibitive.

The business of regenerating pre-consumer and post consumer waste in Australia is promising. It has the potential to found a new industry and green jobs while mitigating land fill and at the same time as providing green inputs to external industries.

1 Proposed CRC: The Australian Fibre & Textile Environmental and Recycling Cooperative Research Centre (AFTER-CRC)

The Australian technical and nonwoven textile industry, in conjunction with Australia's premier R&D organisations, is strategically positioned to provide solutions to the key issues by developing frontier technologies for waste mitigation in manufacture; new or improved fibres and polymers for sustainable manufacture; new products from waste materials; recycling and regeneration technologies; and innovative and practical solutions for product stewardship. To identify end-user led R&D and companies that would benefit from this knowledge, the TTNA (on the oxygen of optimism and opportunity) is seeking engagement from interested parties to join this initiative.

CRC's require all participants to contribute cash and/or in-kind resources to the collaboration. The TTNA is therefore seeking commitments from technical and nonwoven textile and supply chain partners in order to progress this initiative.

2 Preamble

Recent estimates indicate that of up to 1 million tonnes of fibre, textiles and used apparel are disposed of to (approve) landfill, resulting in not only an unnecessary consumption of valuable landfill capacity, but an unsustainable loss of the resource value inherent in the fibrous material. Aside from our environmental responsibilities, this issue points to a prevailing market failure that presents a commercial opportunity for environmentally innovative solutions.

Currently Australia does not have legislation that requires manufacturers or importers to be responsible for the disposal of product at the end of its useful life. However as our governments transition to more European styled environmental laws it is probable that the regulatory environment will become more restrictive.

Recycling as a commercially viable activity has been limited to few products such as metals, paper, plastic and glass. Indeed, growth in the recycling technologies of these industries has already made many fortunes in Australia and overseas. There is no doubt that end-of-life uses for fibre, textiles and apparel in Australia form an undervalued resource.

2.1 The industry:

The textiles, clothing and footwear (TCF) industry in Australia comprises approximately 680 firms, with more than 50% concentrated in Victoria. As well as being the supplier of textile related materials to consumers, the industry also supplies materials to other manufacturing sectors including automotive, filtration, mining, building, marine, composites and outdoor protection. One of the many sustainability issues facing the industry is the quantity of textile waste that is sent to landfill at great cost to the industry and the taxpayer. It is not only the TCF companies which generate textile waste, but also their customers in the industrial manufacturing sector.

2.2 What is “textile waste”?

Like all wastes, textile waste originates from the community via a number of streams including the fibre, textile and clothing manufacturing industry, consumers, the commercial and service industries. These are defined as pre-consumer, post-consumer and industrial textile waste.

2.2.1 Pre-consumer textile waste

Pre-consumer textile waste is manufacturing waste that is generated by processing fibres, (either natural or synthetic fibres) and the production of finished yarns and textiles, technical textiles, nonwovens, garments and footwear, including off-cuts, selvages, shearings, rejected materials and/or B-grade garments. Most pre-consumer textile waste is usually “clean waste” that is sent to landfill.

2.2.2 Post-consumer textile waste

Post-consumer textile waste consists of any type of garments or household textile (such as sheets or towels) that the consumer no longer needs and decides to discard, either because they are worn out, damaged, outgrown, or have gone out of fashion. This category has typically been of reasonable to good quality garments that can be recycled as second-hand clothing, much of which is sold to third-world nations. Clothing that is



unlikely to be worn again is potentially functional as it may be shredded into fibre to be used in products similar in nature to those manufactured from pre-consumer textile waste. Whilst the charitable recycling system provides a “second life” for used clothes they will ultimately be sent to landfill.

2.2.3 Industrial textile waste

Industrial textile waste is generated from commercial and industrial textile applications and includes carpets and curtains, hospital refuse, and industrial applications such as filtration, conveyor belting, and temporary structures etc. Industrial textile waste is usually “dirty waste”. Collection and chemical contamination issues render this category as the least likely to be recovered in Australia. A substantial proportion of these end-of-life goods are consigned to landfill.

2.3 Recovering and repurposing fibrous waste

The multi-billion dollar worldwide recycling industry performs a vital social and environmental function. The industry has no peer in terms of conserving the world's resources while the various stages of the recycling process provide significant employment around the world.

All textile waste streams are often unrealised sources of valuable raw materials that can be repurposed or regenerated into saleable and usable products by intelligent collection, sorting, reengineering and reprocessing. With investment in appropriate research & development and technology, there are a number of ways by which textile waste can be recovered. In essence, the liability of “waste” is turned into an asset often based on intellectual property (IP) which has been specifically developed.

3 Proposed Research and development platforms

Research, development and innovation have long been pillars of the Australian fibre, textile and clothing industry and can be credited for much of the industry’s advancement. Regenerating issues such as the extraction of chemical contaminants, and the development of end use products can only be solved by RDI and an industry and government commitment.

Investment in research, development and innovation for the purpose of acquiring new knowledge and creating new or improved materials, products, processes or services to regenerate textiles will positively serve the Australian environment; and has the potential to found a new industry and green jobs while mitigating landfill and providing cost effective green inputs for new products. These products could be as diverse as a recycled-fibre replacement for cardboard boxes to floating islands from textile waste that rehabilitate eco-systems. The need is to develop enabling technologies that would make these new markets possible. Participants are likely to dictate their preferred area of research, however following is a guideline of what research may be achievable:

3.1 Program 1- Waste Minimisation at Source of Manufacture

This Program would focus on the two key areas of (i) Processing Efficiencies and (ii) Materials Selection for Recyclability.

- (i) Processing Efficiencies - including processing plant (modification for waste minimisation), quality control technologies (for close specification), and plant modification (for energy use minimisation).
- (ii) Materials Selection for Recyclability – including product variants by fibre or material substitution to aid recyclability, new and/or modified polymers with accelerated degradation, and material compatibility for ease of post use separation and recycling.

3.2 Program 2- New Products/Uses/Markets from Recycled Materials

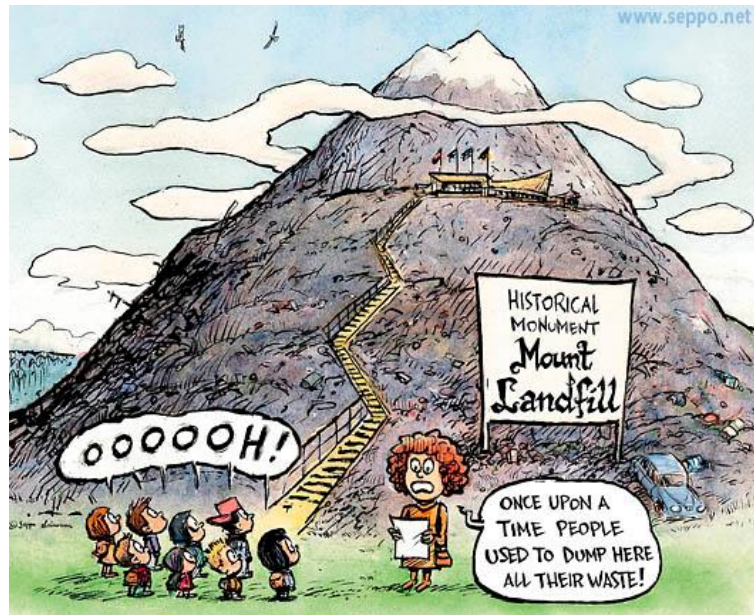
This Program would focus on the four key areas of (i) Reconstituted Original Polymeric Materials; (ii) New Products from Recycled Materials; (iii) Technologies for Fibre Recycling; and (iv) Energy Reclamation and Uses.

- (i) Reconstituted Original Polymeric Materials –focus on returning both pre and post use waste textile materials to their original form for re-use as new feedstock.
- (ii) New Products from Recycled Materials –focus on developing higher value added products from these feed stocks without limitation to scope, although projects having an environmental focus are clearly of interest.
- (iii) Technologies for Fibre Recycling –to cover three key areas of: new technologies for fibre identification to assist sorting and classification (pre-textile disassembly); processing plant for product disassembly,

- fibre individualisation, and separation; and sensors and sorting technologies (pre and post textile disassembly).
- (iv) Energy Reclamation – for fibre and textile waste for which recycling, separation, or re-constitution are not treatment options. Research would focus on environmentally appropriate methods to harvest the energy used in creation of the fibre, textile or polymer for re-use in textile plants or re-distribution.

3.3 Program 3 - Education

The Education Program would cover the entire research scope of the CRC, with post-graduate programs covering the fundamental research required in both research streams as well as industrial level education programs focussed on workforce education and elevating the level of knowledge and awareness within the industry of the key technical considerations of sustainable fibre and textile manufacture.



Press release:

On the 16th December 2009, Senator Kim Carr, the Minister for Innovation, Industry, Science and Research, called for applications to the 2010 CRC Program selection round. The program supports research partnerships that deliver key economic, environmental and social benefits to Australia.

The Minister stated that the 2010 CRC Program selection round would focus on the key areas of manufacturing and social innovation. "Applications from all industry and community sectors and research disciplines are invited. I am especially calling for applications in two priority areas - manufacturing innovation and social innovation. These areas closely fit the program's objectives and are important priority areas for the Rudd Government and Australia."

"Manufacturing innovation can focus on traditional areas such as automotive, textile, footwear and clothing industries, or in new and emerging industries such as scientific and medical instruments, specialist engineering, aerospace, and advanced materials.

"Social innovation will target areas of major social challenge and will be interpreted broadly. Issues such as ageing, substance abuse, participation in education and sport are possible priority areas. Other areas include low socio-economic groups, rural and remote issues, and Indigenous Australians.

"The program will continue to support innovative research that relies on cross-disciplinary and collaborative approaches, to drive research solutions to the major challenges facing Australians today."

4 Background on CRC's

CRCs pursue solutions to challenges that are innovative, of high impact and capable of being effectively deployed by the end-users.

The Cooperative Research Centres (CRCs) program is a Commonwealth Government initiative that seeks to deliver significant economic, environmental and social benefits to Australia by supporting end-user driven research partnerships that address clearly articulated, major challenges that require medium to long term collaborative efforts.

The Cooperative Research Centres (CRC) Programme was established in 1990 to strengthen collaborative research links between industry, research organizations, educational institutions and relevant government agencies. The current objective of the Programme is to enhance Australia's industrial, commercial and economic growth through the development of sustained, user-driven, cooperative public-private research centres that achieve high levels of outcomes in adoption and commercialisation.

Since the start of the Programme at least 158 Cooperative Research Centres have been established, for periods of 7 years each in the first instance. There are currently 48 CRCs operating in 6 broad CRC sectors:

- manufacturing technology (7),
- information & communications technology (5),
- mining & energy (4),
- agriculture & rural based manufacturing (14),
- environment (10)
- medical science & technology (8)

By bringing researchers and research users together, CRCs are designed to change the way in which research is done in Australia by encouraging team work and helping to develop new linkages with industry both nationally and internationally.

Proposed CRCs have to compete with each other in a competitive selection round process. If selected, the CRC then enters into a contractual arrangement with the Commonwealth under the CRC programme (the Commonwealth Agreement). Each CRC must also set in place core or establishment participant arrangements with its founding bodies. These are done on a contractual basis and result in the "Centre /Participants Agreement".

Following the O'Hare review public good (social & environmental benefits) was reinstated as a key objective of the Program.

4.1 CRC Activities

CRCs are partnerships which must include at least one Australian higher education institution and one Australian end-user as essential participants. Commonly, they contain a number of research providers and a number of end users. The numbers vary, but the aim is to achieve a critical mass from both categories to create, deliver and apply the research objectives. This may result in six to eight

universities or other research institutions and ten to fifteen investors or end users. In some cases the critical mass is achieved by a tightly focused group but in others a large partnership is required – water CRC is a joint venture made up of 45 of Australia’s leading water-cycle management, consulting and research organisations. Participants include ‘essential participants’ who contribute resources to the CRC.

CRCs must develop an end-user-focused education and training program at least including, but not limited to, a PhD program that complements the research programs and that builds engagement. CRCs are encouraged to consider global research and education engagement and where appropriate co-investment arrangements. They are also encouraged to develop small or medium enterprise (SME) strategies that build small company innovation and/or R&D capacity.

They generally have demonstration / utilisation activities to deploy research outputs and encourage take up by end-users.

CRCs must undertake:

- medium to long-term end-user driven collaborative research;
- An end-user-focused education and training that complements the research programs and that builds engagement, innovation and R&D capacity within end-users. It must include a PhD program but is not limited to just PhDs.
- SME engagement strategies to build innovation and R&D capacity within SMEs; and
- Utilisation activities to deploy research outputs and encourage take up by end-users.

SME engagement strategies are an important element of the new CRC Program: in Australia 99% of ‘employing’ businesses were SMEs; and contributed almost 60% of Australia’s GDP.

4.2 Funding

The level of funding sought and approved will depend on the complexity of the challenge being addressed. There are no specific limits set. Collaborations will need to justify the amount sought.

The Guidelines provide an indicative range based on the 2006 round, which averages out at \$45 million over 10 years.

The Guidelines encourage varying periods, up to 10 years, to reflect the effort required to address the major challenge being tackled.

There is provision for new CRCs to apply for an extension of their grant, in exceptional circumstances, and through a competitive, merit based selection process. They are required to exit the Program after 15 years of funding.

Collaborations may apply for supplementary funding but only in exceptional circumstances and again through a competitive merit based selection process.

4.3 Bid Selection Criteria

All compliant applications are assessed on merit by the CRC Committee against the following three selection criteria:

Criterion 1 – Research: The proposal will undertake excellent quality research that addresses issues of economic, environmental and/or social significance to Australia. Assessment focuses on:

- the excellence and innovativeness of the proposed work – transformational versus incremental;

- its relevance to end-users – does it clearly address a major challenge for the end user and is not just an interesting research question;
- the track record of key researchers – is it the best team and do they have an international reputation;
- the adequacy and appropriateness of IP; and
- The appropriateness of the proposed utilisation strategy.

Criterion 2 – Results: The outputs from the proposed research, when implemented, will deliver high levels of economic, environmental and/or social benefits to Australia. Assessment focuses on:

- Potential to deliver substantial economic, environmental and/or social benefits that are highly relevant to end-users;
- The scale (quantity and value); and
- The time frame of the expected benefits.

Criterion 3 – Resources: The proposed collaboration will marshal the appropriate participants and other resources necessary to achieve the proposed outputs. Assessment focuses on:

- The quality of the leadership team, particularly individual expertise and past achievements;
- Justification for the level of funding in relation to the expected benefits, the return on investment, and the relative levels of participant contributions;
- The need for a collaborative effort to address the major challenge – is it sufficiently complex to warrant a collaborative effort;
- The relevance of the participants to the collaboration;
- The appropriateness and adequacy of the proposed governance and management structures; and
- The resources to undertake the activities to achieve the outputs to deliver the proposed benefits.

4.4 Contributions

The Guidelines require all participants to contribute resources to the collaboration (cash and/or in-kind). Cash and in-kind contributions are treated equally. However, the Minister has sought assurance from the Department that participants provide the level and quality of in-kind contributions promised. Participant contributions must at least match the amount of CRC grant sought.

Participant contributions must at least match the value of the Commonwealth CRC grant sought. Commonly, the participants' cash contribution is of the same quantum as the CRC grant.

4.5 Confidentiality

The resulting intellectual property is owned by the given CRC, however arrangements on the use of the IP can be made in the initial concept phase of the CRC.

4.6 The competitive process

The resources required for a CRC Program bid are significant, as are the commitments and undertakings made by core partners. Combined with this, the scope of challenges CRCs have to address makes them large and ambitious activities. Against that backdrop, the attrition rate of bids is not surprisingly high.

In recent rounds, it has been common for there to be 30-40 'discussions' about a bid. These have translated to about 20 fully-funded, formal bids which address all

the selection criteria. The CRC selection process has reduced these to about 15 interview stage and around 10 bids have succeeded.