Background
The South African sugar industry, a strategically important agro-processing industry in South Africa, is one of the world’s low cost producers. However, in common with many other similar industries, it is a mature industry, showing signs of decline and it is facing a changing and increasingly competitive marketplace. It has become clear that for the industry to remain competitive and sustainable into the future, breakthrough and even disruptive technologies will be required to create the necessary step change. It is understood that this can be achieved by:

1. Radically reducing the costs of production and improving the profitability of producing sugar by using novel processing technologies and strategies. This includes process optimisation and improving energy efficiency to reduce the “loss” of potential value.
2. Incorporating a strategy of diversification and beneficiation by creating new revenue streams through adoption of an integrated Biorefinery approach.

The South African sugar industry has recently been exploring opportunities for additional revenue generation by means of 1) bioethanol and 2) co-generation of electricity for sale to the national grid. Global trends indicate that sugar industries are transforming to be producers of sugar, electricity and ethanol and that having at least three revenue streams improves the sustainability of the industry. However, for the South African industry to fully maximise the potential and, consequently, the competitiveness of the industry in the medium-term, R&D to develop new products based upon the three product streams and their associated by-products/waste streams, and how to best integrate such within the production environment, will be required. This is the basis of the STEP-Bio programme supported by the South African sugarcane processing industry and the DST’s Industry Innovation Partnerships Initiative.

In order to achieve the desired outputs in the short-to-medium term and to improve the competitiveness of the industry, also in the medium-to-longer term, expertise will be required to be built up to conduct research in selected sugarcane biorefining technology focus areas. The development of this expertise will also be vital in the transfer of the newly-developed technologies to the sugarcane processing industry, which currently suffers from a shortage of highly skilled engineers and technologists. Thus, there is a clear need for expanded investment into Research, Development and Innovation and human capacity development in science, engineering and technology (SET), both for the research, development and innovation required and for provision of
the skills required to operate and manage the sugarcane biorefineries of the future. This is the basis of the STEP-Bio Programme supported by the South African sugarcane processing industry and the DST’s Industry Innovation Partnerships Initiative.

Objectives of the STEP-Bio Programme

- grow significantly the amount of sugarcane processing R&D being conducted in South Africa;
- ensure the sugarcane processing R&D conducted is coordinated and aligned with the South African sugarcane processing industry’s strategic objectives;
- create a sugarcane biorefinery research unit in KZN (in the region in which the biomass exists), including the necessary research infrastructure, high level human competence i.e. skilled and experienced researchers including appointing expertise at the Research Chair level;
- fund R&D projects and post-graduate bursaries aligned with the sugarcane processing industry’s strategic objectives;
- enhance R&D capacity and SET excellence;
- increase the number of scientists, engineers and technologists with sugarcane biorefining competence available to join the sugarcane processing and allied industries;
- initiate and develop the technology required to establish a technologically advanced agro-processing sugarcane processing industry in South Africa;
- promote the development of a network of collaborators both locally and internationally;
- generate commercialisable Intellectual Property; and
- increase the overall competitiveness of the South African sugarcane processing industry which will lead to more sugarcane being grown and the creation of more jobs.

Research and Development Themes

In order to understand what would be required to support the industry and improve its competitiveness in the short-to-medium term, the following three general R&D themes were identified, within which a number of relevant and impactful project clusters have been identified as detailed below. Please note that the STEP-Bio Programme Steering Committee may add, remove or modify themes and project clusters as deemed necessary during the course of the Programme. Certain project clusters are considered to be of higher priority than others and proposals in respect of these clusters are particularly encouraged. Further details of the specific issues, requirements and priorities of these themes and project clusters may be found in the document [STEP-Bio Themes and Project Clusters](#).

- **Theme 1: Risk-mitigation**

  These are projects that will mitigate risks associated with increased production of bioethanol and cogeneration that could have environmental and sustainability impacts if not addressed. They will also consider how so-called “waste” streams could be turned into revenue generating opportunities.

  - [Project Cluster 1.1: Minimisation and beneficiation of effluent (vinasse) from bioethanol production](#)
  - [Project Cluster 1.2: Disposal or beneficiation of boiler ash](#)
• **Theme 2: Enabling of Opportunities**

Within this theme, opportunities will be researched that have the potential to boost industry profitability, but which, if not addressed, do not pose a clear risk, other than the omnipresent issue of economic sustainability.

- Project Cluster 2.1: Options for biomass off-crop storage
- Project Cluster 2.2: Value addition to sucrose
- Project Cluster 2.3: Value addition to ethanol

• **Theme 3: Strategic and decision-support projects**

The projects within this theme are intended to assist with providing information for decision-making purposes primarily to provide direction for further research efforts so as to be able to maximise the opportunities available in the medium term.

- Project Cluster 3.1: The techno-economics of sugar, ethanol and cogeneration in South Africa
- Project Cluster 3.2: Optimising energy efficiency and integration in South African sugar mills
- Project Cluster 3.3: Study of local market opportunities for bio-based chemicals from sugarcane

**STEP-Bio Programme Budget and Allowable Costs**

The STEP-Bio Programme will commence immediately with an initial funding period to the end of March 2018. This may be extended pending demonstrated delivery against the STEP-Bio Programme objectives and granting of additional funding from DST. A further call will be made in August 2015 for projects to commence in January 2016. The following will be considered for funding in this STEP-Bio Programme.

1. Bursaries for Honours (R50 000.00 p.a.), Masters (R80 000.00 p.a.) and PhD students (R120 000.00 p.a.) in relevant fields. The maximum period of support for individual students will be one year for Honours, two years for Masters and three years for PhD students.
2. Support for Post-doctoral researchers (R180 000.00 p.a.).
3. Reasonable running and equipment costs up to a maximum of R80 000.00 p.a. per project. Major research equipment and instruments will not be funded under this call, but should either be already available at the HEI or applying organisation or application for funding through the NRF RISP programme should be pursued.
4. Reasonable subsistence and travel costs for students and researchers to attend limited local and overseas conferences and workshops of relevance and for study visits to international research groups.
5. Reasonable subsistence and travel costs to bring international visiting researchers to South Africa for purposes of collaboration.
6. University administration fees. As this is a partly DST-funded programme, these fees will be limited to a maximum of 10% of the total project costs.
As part of the STEP-Bio Programme funding is coming from the sugarcane processing industry, and indeed the Sugar Milling Research Institute NPC (SMRI) will be the recipient of the DST funding, applicants are encouraged to apply in addition for the National Research Foundation’s (NRF) Technology and Human Resources for Industry Programme (THRIP) funding. Proposals that are able to leverage external funding will be accorded a higher priority.

Project funding will be disbursed quarterly based on satisfactory progress being made against agreed milestones.

**Reporting**

- Quarterly progress reports are to be submitted to the STEP-Bio Programme Manager indicating progress against agreed milestones and Key Performance Indicators.
- The STEP-Bio Programme Steering Committee will meet six-monthly to review progress.
- An Annual Research Meeting will be held (to coincide with a Steering Committee meeting) at which students/researchers/supervisors may be expected to present their work. The costs of attendance of these meetings must be covered by the HEI.
- In addition, writing of technical reports, publication of results in relevant journals and presentation of research works at relevant congresses will be key performance indicators.

**Submission of Proposals**

Proposals are to be submitted on the Proposal and Budget templates available for download here [(Proposal Template) and (Budget Template)]. All fields must be completed and additional supporting documentation may be attached.

Please note:

- Proposals must clearly indicate how the proposed project(s) will address and deliver upon the STEP-Bio Programme objectives listed above.
- Clear linkages between the R&D work proposed and the ultimate potential impact on the sustainability of the South African sugarcane industry and the retention/creation of jobs must be highlighted.
- Proposals must show clear evidence of development of human capacity in SET to supply enhanced SET capacity to design, build and operate sugarcane biorefineries of the future.
- Proposed projects must not duplicate work carried out elsewhere (applicants should have a good knowledge of such relevant work) but should seek to make use of complementary skills and knowledge available through appropriate collaborations.
- Intellectual Property rights are to be reserved for the South African sugarcane processing industry.
- Applicants may be required to supply additional supporting information and or to modify their proposals.
- The approval and continuation of support of projects shall be at the discretion of the STEP-Bio Programme Steering Committee, and the Steering Committee shall not be obliged to divulge or justify reasons for any decisions made in respect of project approval or support.
- Only successful applicants will be responded to.
STEP-Bio Programme Call for Research Funding Proposals

**Timelines**

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Announcement of call</td>
<td>14 October 2014</td>
</tr>
<tr>
<td>Deadline for Proposal submission</td>
<td>14 November 2014</td>
</tr>
<tr>
<td>Review process</td>
<td>15 November – 2 December 2014</td>
</tr>
<tr>
<td>Award notification</td>
<td>12 December 2014</td>
</tr>
<tr>
<td>Completion of contracts and transfer of funds</td>
<td>No later than 31 March 2015¹</td>
</tr>
</tbody>
</table>

¹ Subject to SMRI being in receipt of funds from DST

For further information, please contact the SMRI Research and Development Manager, Steve Davis, at [sdavis@smri.org](mailto:sdavis@smri.org), telephone (w) 031-2731354.