South Africa's Third National Communication under the United Nations Framework Convention on Climate Change

Appendices A,C and D

Department of Environmental Affairs

Republic of South Africa

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

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Appendix A

South Africa's National GHG Inventory Management System (NGHGIS)

The United Nations Framework Convention on Climate Change (UNFCCC) stipulates that signatory parties are required to submit inventory reports that account the nations GHG sources and sinks. Where Annex I parties are mandated to report on their emissions on annual basis, Non-Annex I parties such as South Africa are only required to submit inventories as part of their National Communications (NC) every four years. In recent years, as part of the Durban agreement, Non-Annex I parties are now obligated to submit inventories every two years as part of their biennial update reports (BURs). This regular reporting becomes challenging if countries do not have well established systematic approaches in place for developing their inventories.

The National Climate Change Response Policy (NCCRP) stated that SA would "*Establish a national system of data collection to provide detailed, complete, accurate and up-to-date emissions data in the form of a Greenhouse Gas Inventory…. The emissions inventory will be a web-based GHG Emission Reporting System and will form part of the National Atmospheric Emission Inventory component of the SAAQIS*." (DEA, 2011). This project aims to fulfil this obligation and develop a National GHG Inventory Management System for South Africa.

South Africa's national inventory system is being designed and operated to ensure transparency, consistency, comparability, completeness and accuracy (TCCCA) of inventories as defined in the guidelines for preparation of inventories. The system ensures the quality of the inventory through planning, preparation and management of inventory activities in accordance with Article 5 of the Kyoto Protocol. The following processes are included and detailed in the national system:

- collection of activity data
- selection of methodologies and emissions factors
- estimation of GHG emissions by source and removals by sink
- implementation of uncertainty assessments
- quality assurance activities and
- verification at the national level.

The national inventory systems comprises both the inventory report itself and all the documents around the inventory which describe how the inventory was prepared. The system complies with Article 5 of the Kyoto Protocol (Kyoto Protocol, 1997) by also defining and allocating specific responsibilities in the inventory development process, including those related to choice of methods, data collection, processing and archiving, and quality assurance and quality control (QA/QC). South Africa has also specified the roles and cooperation between government agencies and other entities involved in the preparation of the inventory.

Development of the NGHGIS

The NGHGIS is being developed in four main phases:

- Phase 1: Web-based GHG inventory process management tool
- Phase 2: Design and formalize institutional arrangements and data flows
- Phase 3: Development of a GHG quality management system
- Phase 4: Development of data collection templates and technical reporting guidelines.

The NGHGIS project aims to be completed by end of 2017.

Phase 1: Web-based GHG inventory process management tool

A web-based tool was developed on share-point at the beginning of the project (Figure A.1) but it will continue to be developed throughout the course of the project (Feb 2016 – Dec 2017). The aim is to populate it with the current inventory data and allow users to login and use the tool. In this way modifications can be made to the tool so as to make it specific for South Africa's needs.

Figure A.1 shows the home page to the system with menu bar down the left hand side of the page which is used to navigate through the system. The menu includes the following main tabs:

- National system:
    - Work plan;
    - Requirements;
    - Stakeholders;
    - Input datasets;
    - Improvement lists;
- QA/QC plan:
    - QA/QC Objectives;
    - QA/QC checks;
    - QA/QC log;
    - QA/QC tools;
- Methods and data sources:
    - Summary of methods and completeness;
    - Method statements;
    - GHG estimation files;
    - Key references;
- Trends and data:
    - GHG trends viewer;
    - Key categories;
- Reports:
    - SA GHG Public site.

Stakeholders, input data sets, improvements, QA/QC plan, method statements, GHG estimation files and key references have already been loaded onto the national system. These have used information for the 2015 inventory which is currently being prepared. An earlier version of the 2012 inventory has been incorporated so that the trends viewer could be tested. Once the 2015 inventory data is complete this data will be loaded onto the system. There has also been some discussion around the public site and what should be on this site. This well be developed further during the rest of the project.

Another component of this phase is the development of manuals for the GHG inventory process tool. These manuals are in the process of being developed and will be completed at the end of the project.

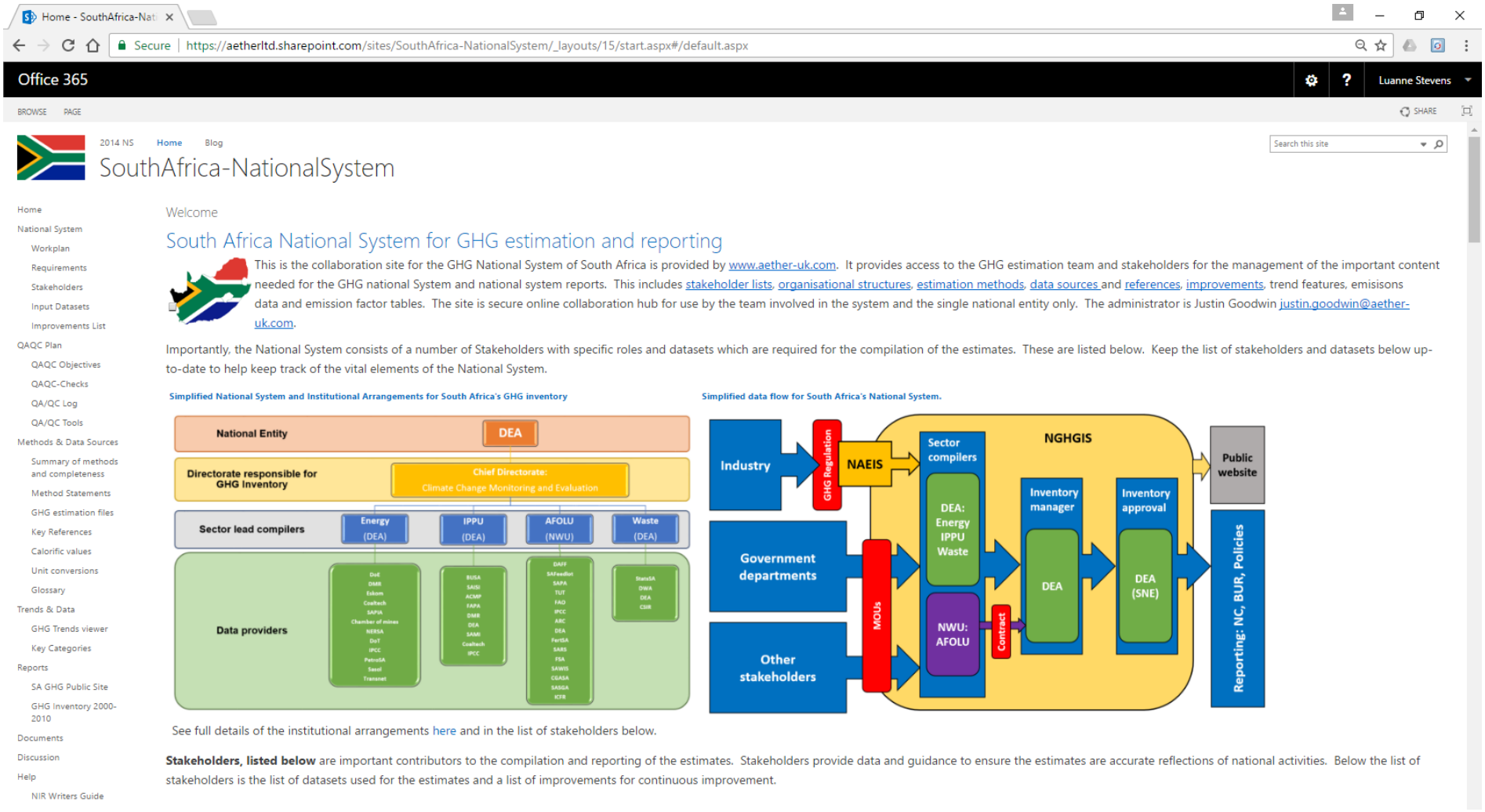


Figure A.1: Home page of the recently developed National GHG Inventory Management System (NGHGIS)

Phase 2: Design and formalize institutional arrangements and data flows

This phase (completed in Dec 2016) provided an assessment of the current inventory compilation process in SA and made comparisons and recommendations (diagrams can be seen in Figure A.1) based on arrangements and procedures in other developing and developed countries. The document also provided details on the roles and responsibilities of different stakeholders including the management team. It also provided guidance on the timelines for the compilation and review (inventory cycle) process.

As part of this phase current relevant data holders were identified and a contacts database was created on the NGHGIS tool. It also identified the nature of the data and an input dataset list was added into the NGHGIS tool.

Another important component of this phase was the legal aspects. Three documents were provided for this section:

- A background document on the law and policy basis of the NGHGIS was provided and this included:
    - A review of the applicable international and domestic law and policy instruments that together form the basis for the establishment of South Africa's NGHGIS;
    - A review of examples of legal provisions relating to the provision of GHG-related data by state organs and private institutions;
    - A discussion of access to information held by the NGHGIS and the protection of commercially confidential information;
    - A discussion of the need for the alignment of South African policies, laws and institutional arrangements for GHG and related data reporting and sharing; and
    - A discussion of the matter of ethics in the collection and disclosure of environmental information and matters of liability.
- A template Memorandum of Understanding between DEA National Inventory Unit and Department X / Minister X / MEC of X / Mayor of Municipality X (Category B Data Provider) on South Africa's National Greenhouse Gas Emission Inventory (Report, Confidentiality, Non-disclosure and Dispute resolution arrangements) – ***Intergovernmental***; and
- A template Memorandum of Understanding between DEA National Inventory Unit and xxxx (Category A / B Data Provider) on South Africa's National Greenhouse Gas Emission Inventory (Report, Confidentiality, Non-disclosure and Dispute resolution arrangements) **–** ***Industry and other non-state institutions.***

Phase 3: Development of a GHG quality management system

Quality management systems in other developed and developing countries was reviewed and an overall QA/QC plan has been drafted for South Africa. This document covers the following:

- Introduction;
- Elements of the QA/QC system:
    - Responsibilities;
    - QA/QC plan:
        - Framework for quality;
        - Overall QA/QC process and timeframes;
        - Quality planning;
        - Quality control;
        - Quality assurance;
        - Conclusions and improvements;
    - Quality control procedures:
        - General procedures;
        - Category specific procedures;
    - Quality assurance procedures;
    - Verification;
    - Reporting, documentation and archiving:
        - Calculation file management
        - Supporting files
        - Data archiving quality control process.

A critical component in this phase has been the redesign and production of new template calculation files for each sector. The previous inventory spreadsheets had a file for each year, making it very difficult to assess the consistency across the time-series. The new templates have all the data for all years (Figure A.2). Furthermore all the relevant input data and emission factors are included in the spreadsheet which assists with traceability. The updated spreadsheets also have a section where previous submission data is entered and then the recalculations are done automatically. Conditional formatting with colour coding is used to highlight where recalculations have led to an increase or decrease in emissions.

In addition to this, spark lines (or trend lines) have been added and colour coding introduced (Figure A.2) so that it is easier and quicker to spot any potential problems or areas which may need to be checked. Comments can be made within these calculation spreadsheets as they are compiled so QC can occur during the compilation process. A series of hash-tags and codes have been identified so the QC analyst can make use of these identifiers in the comments. The last component of this phase is the development of a tool to pull all comments with hash-tags together into one page to create a log of all the QC activities that have taken place within each sector spreadsheet.

Part of this phase was also the development of a data policy to address confidentiality, so an internal NGHGIS data management policy document was drawn up for DEA.

Phase 3 is expected to be completed by the end of April 2017.

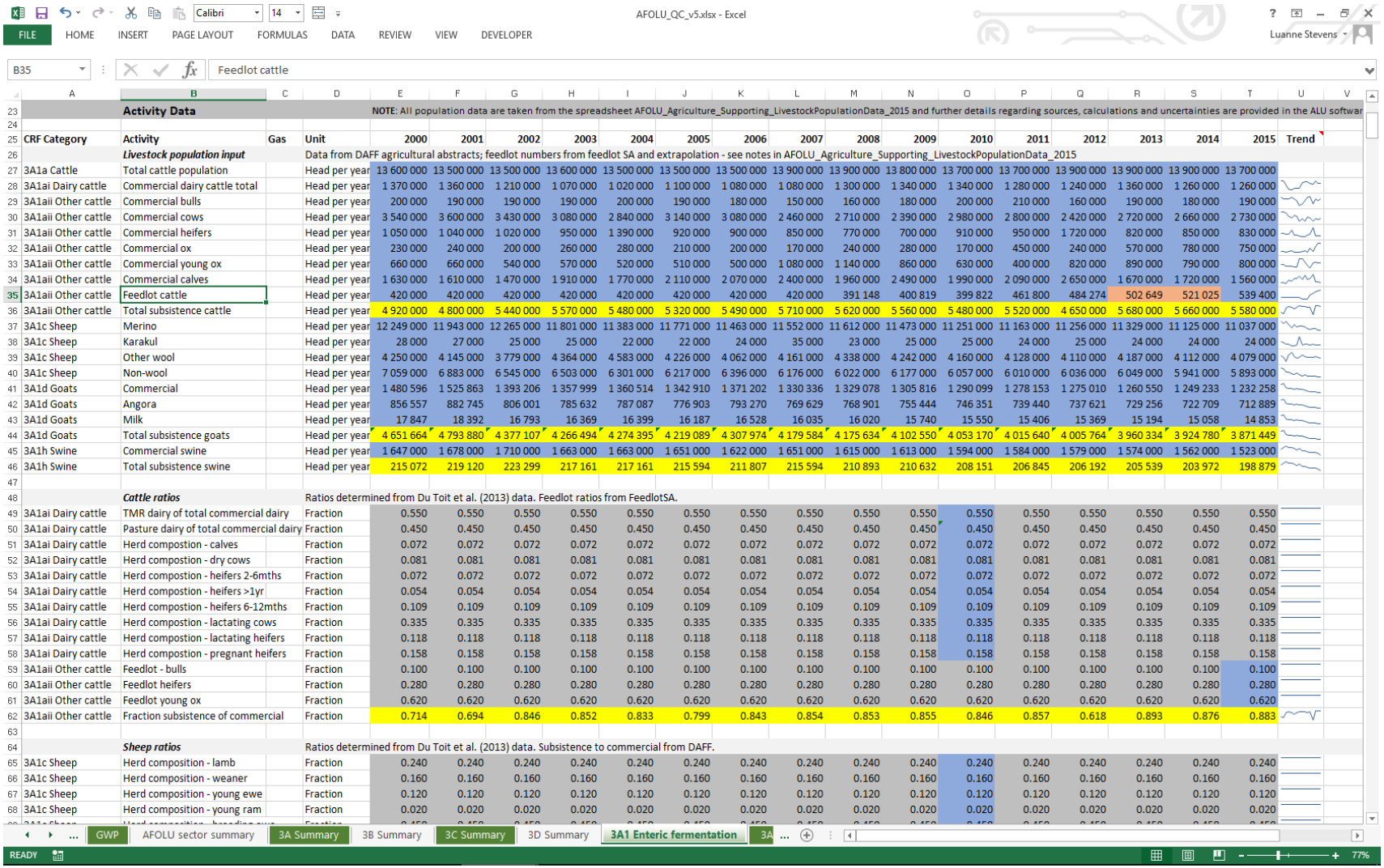


Figure A.2: Example of the new template calculation files showing all the years across the top, trend (spark lines) on the right hand column and the colour coding

Phase 4: Development of data collection templates and technical reporting guidelines

Phase 4 will start in April 2017 and is expected to be completed by November 2017. This phase will involve:

- Developing country specific data collection templates for each sector;
- Developing a data collection plan with timelines for each sector;
- Developing sector and sub-sector specific technical guidelines; and
- Holding workshops with stakeholders to pilot the reporting templates and data collection plans.

Appendix C

Table C1: Nodes and Centres of Expertise Related to Climate Change Research in the Universities of South Africa (modified from Table 6 in SARUA, 2014)

University	Nodes of Expertise	Centres of Expertise
Cape Peninsula University of Technology	Renewable energy, thermal energy systems; Fish farming using renewable energy	Energy Institute
Central University of Technology, Free State	Food safety, biocatalyst and food microbiology	Department of Built Environment which focusses on sustainable building
Durban University of Technology	Indigenous knowledge systems; Integrated water resources management and treatment, environmental modelling	Institute of Systems Science; Institute for Waste and Waste Water Technology
Mangosutho University of Technology	Environmental and medical geology	Research Centre for Algal Biotechnology which is the first centre to produce high quality biodiesel from an indigenous strain of microalgae.
Nelson Mandela Metropolitan University	Sustainability science; Conservation ecology, conservation planning and freshwater management and conservation; Renewable energy; Science and environmental literacy and education	African Earth Observation Network (AEON); Sustainability Research Unit; Centre for African Conservation Ecology; Ecology Coastal and Marine Research Unit; Centre for Energy Research
North West University	Environmental law and governance; Clean energy and clean coal technology development; Renewable energy; Mining and applied environmental science, clean technology; Plant sciences, conservation and rehabilitation; Agricultural entomology and biological control; Soil sciences; Ecotoxicology, environmental chemistry, pollution and environmental management; Climate change and land conflicts	Unit for Environmental Sciences and Management which includes the Climatology Research Group and the Atmospheric Chemistry Research Group; Department of Mechanical Engineering
Rhodes University	Environmental, climate and ecological sciences (including fisheries);	Institute for Water Research; Southern Ocean Group; Environmental Biotechnology Research Unit which includes research

University	Nodes of Expertise	Centres of Expertise
	Aquatic and oceanographic sciences (including climate modelling and water resource management); Physical geography and environmental change; Sustainability leadership for business (including climate change and green economy)	into waste water treatment, alternative energy, biofuels, and renewable energy; SARCHI Chair in Interdisciplinary environmental sciences and rural livelihoods
Tshwane University of Technology	Mining, clean technology, water resources management and treatment; Renewable energy technology;	Centre for Energy and Electric Power; Postharvest Technology Group studying climate change and reducing post-harvest loss of produce
University of Cape Town	Climatology and climate modelling and climate change adaptation; Conservation, environment and global change science; Soil sciences; Oceanographic sciences and meteorology; Marine climate science, fisheries science and geoscience; Integrated water management; Health sciences; Energy, waste and clean technology; Environmental law; Renewable energy; Sustainable development and corporate governance; Biotechnology; Sustainable design and architecture and social change studies	African Climate and Development Initiative (ACDI) which includes: • Climate System Analysis Group (CSAG); • African Centre for Cities (development economics and climate change); • Centre for Film and Media Studies (politics, media and climate); • School of Public Health (climate change and health); • Centre for Criminology (communities managing risks associated with climate change); • Environmental Evaluation Unit which includes the Touws River Solar Energy Facility; • Department of Sociology; and • Schools Development Unit (climate change education); SARCHI Chair in Climate Change; SARCHI Chair of Security and Justice focusing on the governance of environmental security; SARCHI Chair in Modelling of the coupled ocean-land-atmosphere phenomena related to climate change; SARCHI Chair in Marine Ecology and Fisheries focusing on interdisciplinary research into marine social-ecological systems under global change in the Benguela current.
University of Fort Hare	Climate Smart Agriculture; Renewable energy; Climatology and Geomorphology; Water resource management and agricultural water;	Fort Hare Institute of Technology which researches energy efficiency; Renewable Energy Centre of Excellence; Agricultural and Rural Development Research Institute;

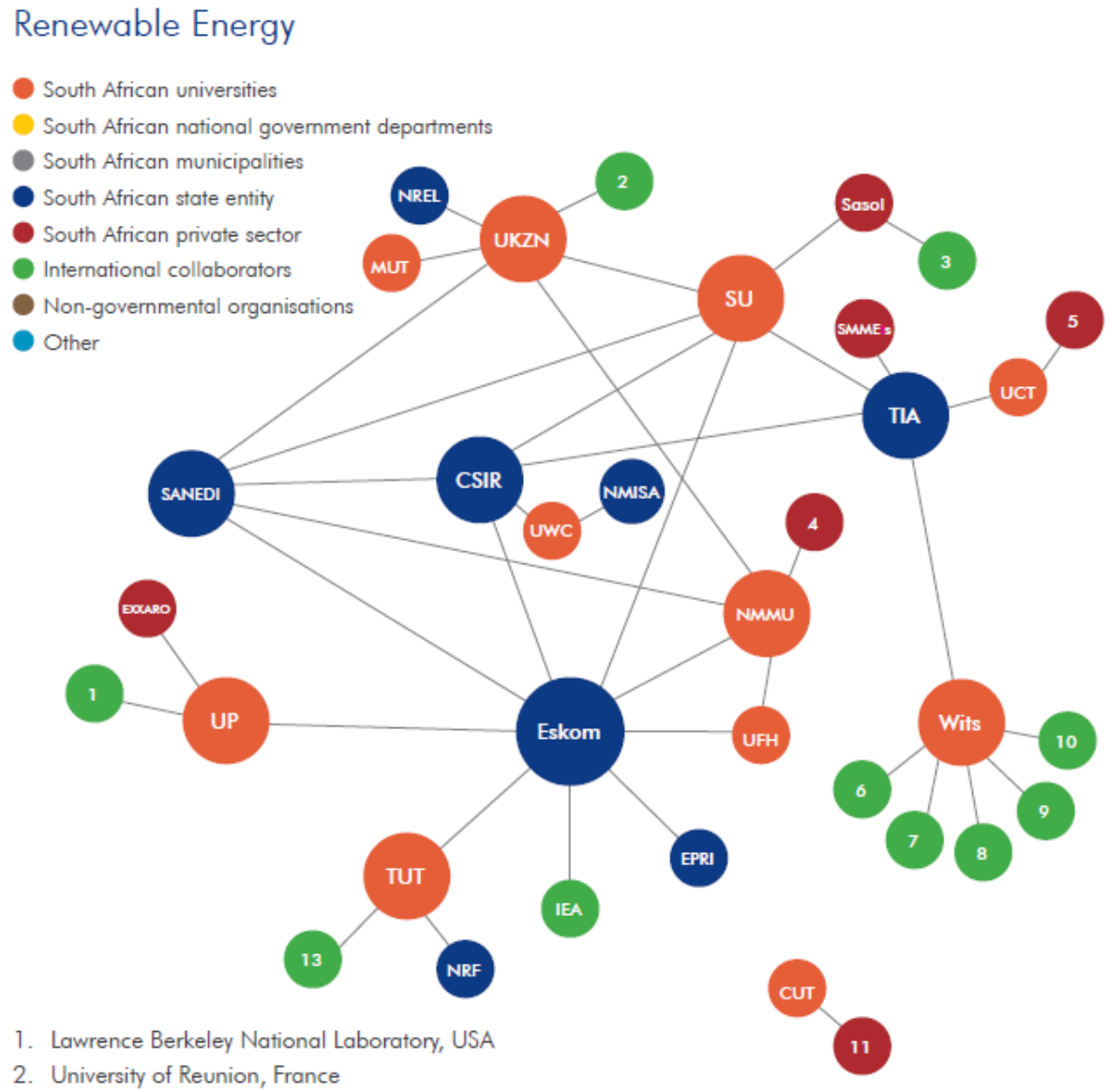
University	Nodes of Expertise	Centres of Expertise
	Agricultural economics, climate vulnerability and adaptation; Conservation agriculture and climate mitigation; Social science studies on climate change risk perceptions	The university also hosts a DST Risk and Vulnerability Science Centre linked to the Global Change National Research Plan; SARCHI Chair in Social Change
University of Johannesburg	Biodiversity and aquatic health; Renewable energy production, energy systems and life cycle engineering; Water demand side modelling; Sustainable construction; Land use, forests and forestry management; International environmental law; Rural livelihoods and vulnerability	Sustainable Energy Technology and Research Centre; Centre for Nanomaterials research; Centre for Aquatic Research
University of KwaZulu-Natal	Renewable energy and smart materials; Biodiversity conservation; Climate modelling, climate change impacts, and crop modelling; Water sciences; Food processing, food engineering, and agricultural engineering	Centre for Water Resource Research; Water, Environment and Biodiversity; Agriculture and food security; Energy and Technology for Sustainable Development
University of Limpopo	Agricultural sciences; Biodiversity; Social change	The university hosts a DST Risk and Vulnerability Assessment Centre (RVAC)
University of Pretoria	Veterinary sciences; Livestock research, including GHG emission factors for livestock and manure; Sustainable agriculture, soil, forestry and water sciences; Environmental law and governance; Human settlements and energy studies; Renewable energy and energy efficiency; Biodiversity, conservation and wildlife management; Health sciences; Climate change economics; Climate change meteorology, climate change adaptation, impact and mitigation; Geology and carbon capture	Centre for Environmental Studies (Dr Olwoch holds a Global Change Grand Challenge Award); Construction Economics (Prof du Plessis holds a Global Change Grand Challenge Award); Geo-informatics and Meteorology; Agricultural economics, extension and rural development (climate change and agricultural adaptation); UP Department of Geology Carbon Storage Working Group (in this group Prof. Wladyslaw Altermann holds the Exxaro Chair in Energy Efficiency)

University	Nodes of Expertise	Centres of Expertise
University of South Africa	Renewable energy; Environmental science and environmental management; Human settlements; Indigenous knowledge systems	Exxaro Chair in Business and Climate Change Institute for Corporate Citizenship; Institute for African Renaissance Studies (including climate change issues); Flagship projects: • Fog harvesting project; • College of Science, Engineering and Technology has several projects focussed around climate change, poverty and pollution and also has a project on fuel cell and nanotechnology
University of Stellenbosch	Ecological sciences, modelling and biological sciences; Sustainable energy development, clean technology and environmental engineering (including wind energy research); Conservation science and biodiversity; Environmental management, sustainable development and environmental economics (including climate change policy and water demand modelling); Agriculture and soil science; Forestry, wood science and carbon sequestration; Environmental ethics and education (including climate change ethics); Disaster risk reduction and public health	Centre for Renewable and Sustainable Energy Studies; Electrical Energy Group and Electrical Machine Laboratory; SARCHI Biofuels Research Chair; Stellenbosch University Water Institute; Centre for Corporate Governance in Africa; Sustainability Institute; Tsama Hub; Department of Forest and Wood Science; DST Centre of Excellence for Invasive Biology
University of the Free State	Microbial biotechnology; Agriculture, soil, animal and plant science; Aquatic and terrestrial biodiversity; Solar energy; Water conservation; Food sciences; Health sciences; History and global change	Disaster Management Training Centre for Africa; Centre for Sustainable Agriculture; Centre for Environmental Management; Department of Agricultural Economics (focusses on economics of climate change adaptation)
University of the Western Cape	Renewable energy, solar energy and hydrogen production and utilization; Biodiversity conservation; Marine biology and marine science; Agricultural economics;	Institute of Water Studies

University	Nodes of Expertise	Centres of Expertise
	Environmental law and governance; Land and agrarian studies	
University of the Witwatersrand	Forestry; Water and hydrology; Geo- and environmental sciences; Environmental engineering; Environmental biogeochemistry; Human settlements; Complexity sciences and conservation	Global Change and Sustainability Research Institute; School of Architecture and Planning (built environment and climate change); School of Animal, Plant and Environmental Sciences has several research projects related to climate change; School of Electrical and Information Engineering conducts renewable energy research; Centre for Applied Legal Studies
University of Venda	Soil sciences and environmental health; Disease prevention; Health related water microbiology research; Biodiversity conservation; Plant breeding	Institute for Rural Development; Institute for Semi-arid Environment and Disaster Management
University of Zululand	Aquatic ecology and environmental impact assessments; Savanna and rangeland ecology; Indigenous knowledge systems	Centre of Integrated Rural Development; Department of Geography and Environmental Studies
Vaal University of Technology	Integrated water resource management; Renewable energy and fuels; Community health and food security	Centre for Sustainable Livelihoods; Institute of Applied Electronics is conducting research into renewable energy; Water and Wastewater Research Group; Environmental Pollution Group
Walter Sisulu University	Plant biology	Centre for Rural Development; School of Applied and Environmental Science

Appendix D

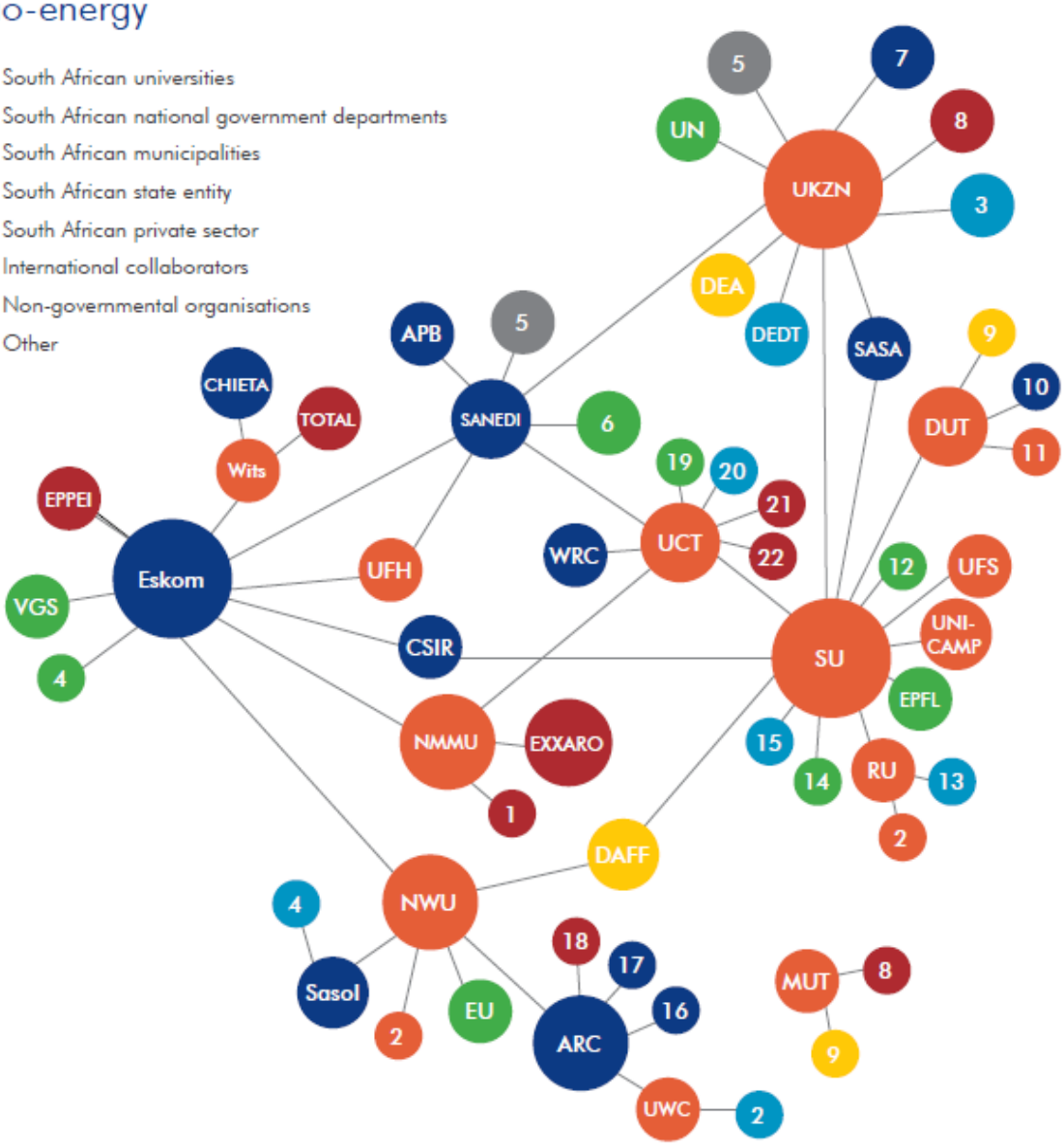
Diagrams illustrating the organizations and collaborating partners which are involved in energy research in South Africa (taken from ASSAf, 2014).



1. Lawrence Berkeley National Laboratory, USA
2. University of Reunion, France
3. International private industries
4. Renewable energy equipment manufacturers
5. South African private sector
6. CNR-IFN, Italy
7. Enrico Fermi Institute (Italy)
8. Chalmers University (Sweden)
9. Dresden University (Germany)
10. Polytochnic of Namibia
11. Rhino Group (House Rhino, Crossroads Farm Village)
12. International organisations

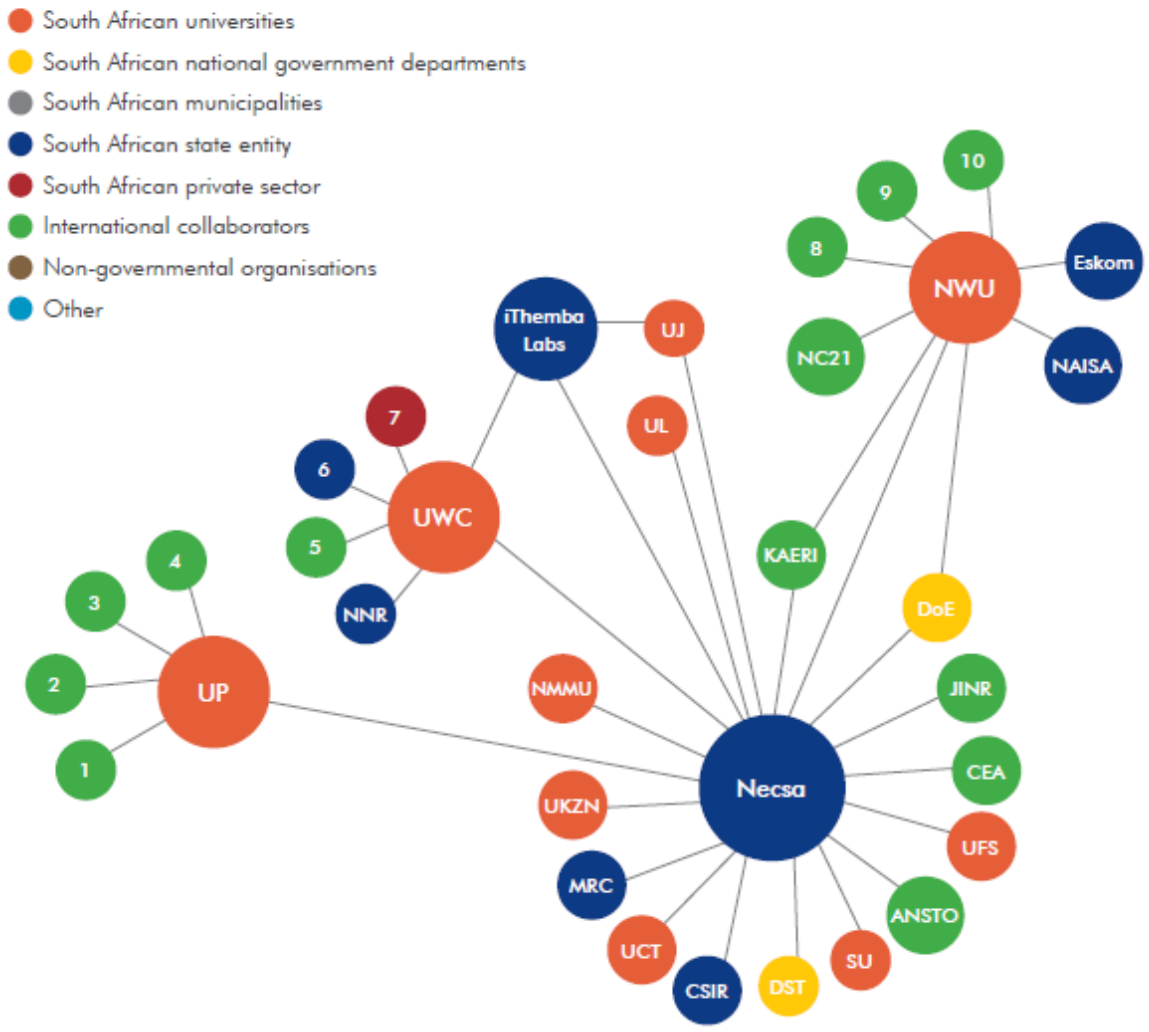
Bio-energy

- South African universities
- South African national government departments
- South African municipalities
- South African state entity
- South African private sector
- International collaborators
- Non-governmental organisations
- Other



1. Hatch-Gaba
2. Academic organisations
3. Local and international academic organasations
4. IEA Bio-energy
5. eThekweni Municipality
6. Biojet working group
7. Lottery
8. Private industry
9. National an local government
10. Water utilities
11. Tertiary institutions
12. Dartmouth College, USA
13. Biogas South Africa
14. Arizone State University, USA
15. Various National System of Innovation organisations
16. ARC – Biotechnology Platform
17. ARC – Grain Crops Institute
18. Pioneer Plastics
19. Cambridge University, UK
20. Start-up companies
21. Anglo Coal
22. South African Breweries

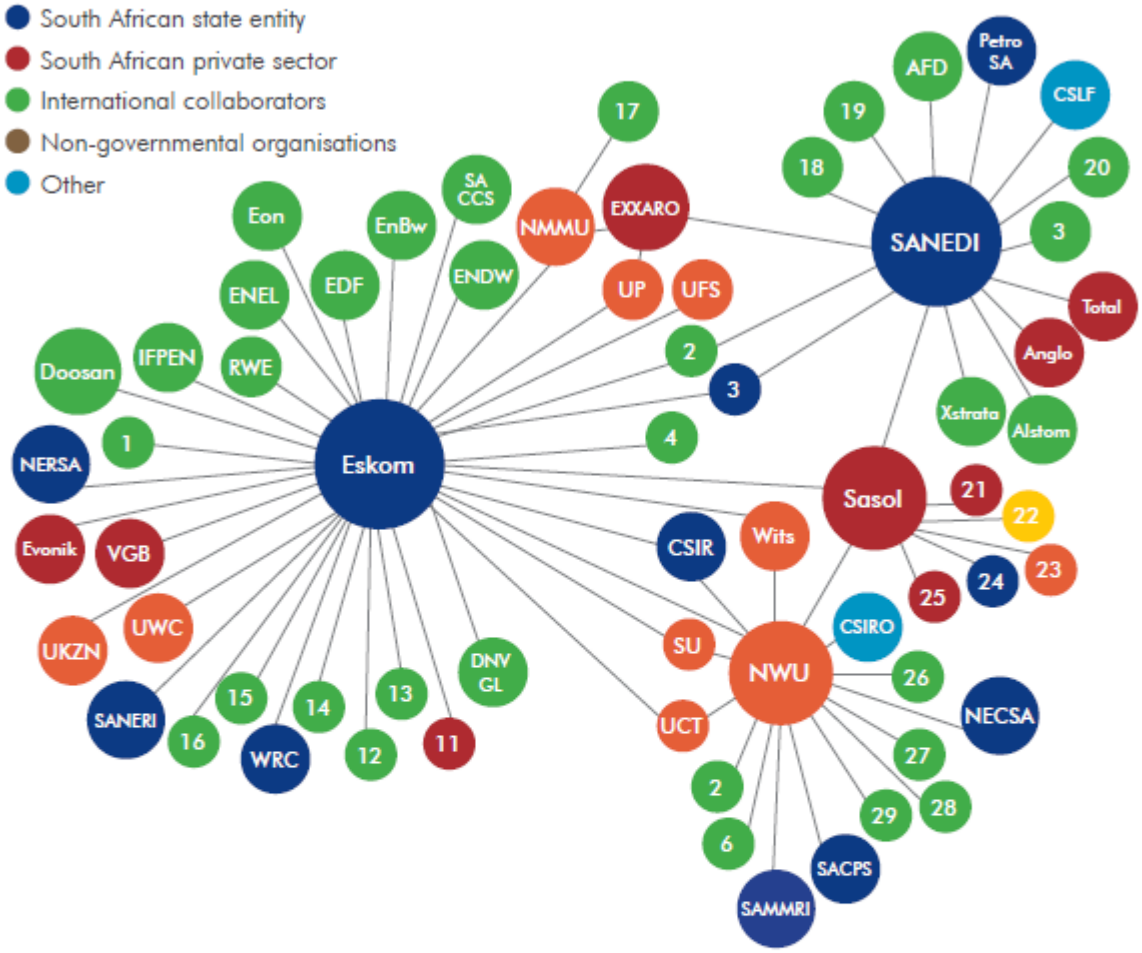
Nuclear Energy



1. Saha Institute for Nuclear Physics, India
2. Fredrich-Schiller University Jena, Germany
3. Pontifícia Universidade Católica do Rio de Janeiro, Brazil
4. Universidade Federal do Rio Grande do Sul, Brazil
5. Earth Institute in Groningen, Netherlands
6. Koeberg Power Station
7. Goldfields South Africa
8. European Atomic Energy Community
9. EU Institute for Transuranium Elements, Italy
10. Intstitute Jean Rond d'Alembert, France

Fossil Fuel Energy

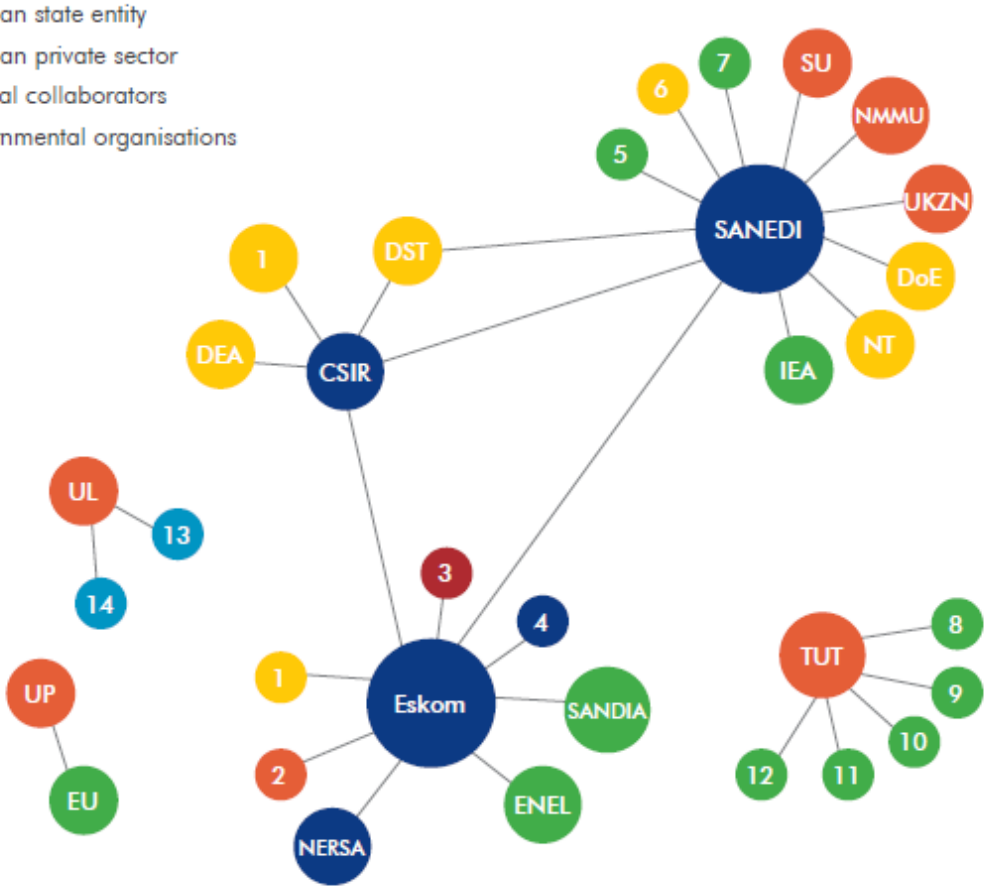
- South African universities
- South African national government departments
- South African municipalities
- South African state entity
- South African private sector
- International collaborators
- Non-governmental organisations
- Other



1. University of Clausthal, Germany
2. Coaltech 2020
3. IEA Bio Energy
4. Seoul National University, South Korea
5. Chonnan
6. Pennsylvania State University, USA
7. Nottingham University, UK
8. Freiberg University, Germany
9. University of Toulouse, France
10. Fossil Fuel Foundation
11. Anglo Coal
12. University of Stuttgart, Germany
13. Steinmuller Engineering
14. The Foundation for Scientific and Industrial Research
15. Netherlands Organisation for Applied Scientific Research
16. OCTAVIUS
17. Hatch-Goba
18. Norwegian government
19. World Bank
20. Global Carbon Capture and Storage Institute
21. Private companies
22. South African government
23. South African universities
24. Science councils
25. Consultants
26. University of Freiberg, Germany
27. Imperial College London, UK
28. University of Twente, Netherlands
29. Petrographics South Africa

Energy efficiency and storage

- South African universities
- South African national government departments
- South African municipalities
- South African state entity
- South African private sector
- International collaborators
- Non-governmental organisations
- Other



1. South African government
2. South African universities
3. Battery South Africa
4. National Electrical Safety Authority
5. Algal Bio-Energy platform
6. eThekweni Municipality
7. Biojet working group
8. University of Tokyo, Japan
9. Key Laboratory of Applied Superconductivity, China
10. Russions R&D Cable Institute
11. Western Michigan Universitt, USA
12. University of Madras, India
13. Local and international academic institutions
14. Local and international public industry