



**Sector Skills Study
Research Report**

March 2018

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1 Introduction and Background

Since South Africa's first democratic elections in 1994, the public Post-School Education and Training (PSET) system has undergone many changes. National policies have been transformed, legislation and regulations have been revised, new institutions have emerged and old ones have been restructured, and alternative funding arrangements have been developed. The Energy and Water SETA (EWSETA) is one of the 21 Sector Education and Training Authorities (SETAs) established in 1999 in terms of the Skills Development Act (1998). The EWSETA includes a range of Energy and Water sector employers both in the public and private sectors. The Skills Development Act defines the functions of a SETA as amongst others to develop and implement a sector skills plan (SSP) within the framework of the national skills development strategy (NSDS). That means the work of a SETA is guided by the NSDS which is currently in its third iteration and commonly referred to as NSDS III.

NSDS III was crafted prior to the work on the Post School Education and Training (PSET) White Paper of 2013. It is noted in the White Paper that *“There will be consultation with key industry role players and other stakeholders to discuss whether the economy-wide and sectoral skills needs set out in the draft scenarios resonate with their understanding of the sector, or whether there are gaps. It is anticipated that this more focused process will allow, indeed require, engagement at a more senior level within industry than has been the case. In effect, the discussions on skills will involve those individuals who are determining the strategy for their companies”*.

There are some important policy pointers in NSDS III that were subsequently developed further in the White Paper. The Vision and Mission of the NSDS III set out important long term intentions of the strategy. The clearly stated intention is for skills development to support inclusive growth, enabling workers to participate in and share the benefits of the growth that will be enabled through skills development. In the DHET Minister's Delivery Agreement with the President of the Republic of South Africa, it is noted that *“There is currently no institutional mechanism that provides credible information and analysis in regards to both the supply (availability and supply pipeline) and demand for skills. While there are a number of disparate information databases and research initiatives, there is a lack of a standardised framework for the determination of skills supply, shortages and vacancies and there is no integrated information system for skills supply and demand across government.”*

The NSDS III thus calls for establishing a credible institutional mechanism for skills planning in South Africa. On this basis the Department of Higher Education and Training (DHET) instituted various processes for developing and improving the skills planning mechanism which included the improvement of sector skills planning processes within SETAs. This is finding expression in the DHET Sector Skills Plan Framework and Requirements (2011 to 2016) which requires SETAs to employ quantitative and qualitative research methods for developing the SSPs. In addition to the framework, the DHET in partnership with the National Skills Authority (NSA) further issued guidelines outlining a standard approach for SETAs to conduct in-depth interviews with key role-players in their sector to gather intelligence on skills needs and integrate the findings for economy-wide skills planning. On the basis of these guidelines, the EWSETA conducted this empirical research study to pilot this standard approach.

2 Methodology

2.1 Approach

A qualitative research approach was used to implement the study. Data collection was facilitated through a semi-structured interview guide which was developed by the DHET and the NSA in consultation with SETAs including the EWSETA. Key informants with knowledge of skills issues in their respective workplaces were identified by the EWSETA.

2.2 Sample size

In line with the DHET guidelines, a total of 11 companies of different sizes (small, medium and large) in the Energy and Water Sector were identified from which to collect data. The DHET guidelines recommend that “For the 2018-2019 training year, each SETA should conduct at least 10 interviews. Ideally, a SETA should conduct one interview per sub-sector. SETAs with less than 10 sub-sectors can conduct more than one interview per sector to reach the target of 10 interviews.” The research could not cover all of the 11 companies at the time of writing the report (see section on limitations below). Data was collected in 10 of the 11 companies. Of the 10 companies in which data was collected, six were in the energy sector, and the other four in the water sector. The table below summarises the companies in which data was collected by size:

Total Number of Small Companies covered	1
Total Number of Medium Companies covered	2
Total Number of Large Companies covered	7

Setting up appointments for data collection

A letter of introduction and request for participation in the study was sent to all companies by an administrator. In addition to sending the letter (which was written by EWSETA), the administrator made telephonic contacts with each participant in the study to set up the interviews. Where the interviews could not be secured on the first try, there were attempts to make follow-up enquiries to set up the appointments.

2.3 Data collection

Data was collected from the beginning of March 2018. Face-to-face and telephonic interviews were conducted with senior and middle level managers in each of the companies in which data was collected. While face to face interviews were the preferred method of collecting data, some of the companies were interviewed telephonically, primarily to minimise the costs of travel as some of the companies that were part of the sample are located in different provinces of the country. The table below summarises the number of companies by province and sector from which data was collected.

Province	Number of employers	Sector (Water)	Sector (Energy)
Gauteng	5	1	4
Kwazulu Natal	1	1	0
Limpopo	1	1	0
Northern Cape	1	0	1
Western Cape	1	0	1
North West	1	1	0
Total	10	4	6

While in some instances the interviews were conducted on a one to one basis, in others more than one interviewee was involved in the interview. In most cases, this was at the request of the participants who were identified as key informants, and based on the fact that other colleagues would provide additional information which the individual interviewee could not provide on their own given the coverage of the questions posed by the research.

A total of 15 interviewees participated in the interviews, the majority (11) of whom were senior managers in the respective companies.

2.4 Limitations

The study faced several limitations during implementation. One of the major limitations of the study was the fact that data could not be collected from all of the eleven companies identified for participation in the research. This was as a result of difficulties experienced in setting up interviews with the most relevant stakeholders. In the case of one company, for example, an interview was successfully scheduled, however, the relevant person was not available when the interviewer arrived at the scheduled venue to undertake the interview. Despite several telephonic follow-up attempts to reschedule the interview, the interview subsequently did not take place.

In other instances, it appears that the letters that were sent to the companies did not reach the potential interviewees on time due to a strike by NEHAWU that was taking place. This created difficulties for the research team to set up appointments. Nevertheless, the administrator who was assisting in setting up interviews made follow up telephonic enquiries, but to no avail.

Still, in other cases, other stakeholders identified did not respond to the letters that were sent by e-mail to set up interviews. Attempts to follow up telephonically did not yield positive results either.

3 Change drivers in the Energy and Water Sector

The study investigated the change drivers which could significantly disrupt or impact operations in the sector as well as the implications of such drivers for skills demand and supply. Five key change drivers were identified in the Energy and Water sector as follows:

- a) Policy context/ changes
- b) Technological changes
- c) Competition for skills
- d) Climate change
- e) Regulatory environment

Each of these is described briefly as follows:

3.1 Policy and Regulatory changes

There have been a number of changes in policies and regulations that impact the Energy and Water sector. For example, the recent move towards renewable energy, as per the adoption of a Renewable Energy Independent Power Producer Programme, have created new pressures related to the socio-economic and enterprise development for the energy sector. This creates the need for new skills to respond appropriately to these new pressures. Similarly, there are new developments in the water sector related to desalination and waste water recycling programmes.

The Department of Water and Sanitation (DWS) requires all water utilities in the country to comply with the Blue Drop Certification Programme for Drinking Water Quality Management Regulation, and the Green Drop Certification Programme for Waste Water Quality Management Regulation. The Blue Drop certification regulation aims to assure that the quality of tap water is fit for human consumption. Furthermore, the Green Drop certification programme for wastewater is an initiative to ensure that these water utilities progressively improve their operations, so as not to impact negatively on the water bodies into which they discharge water.

3.2 Technological changes

The emergence of new technologies is changing the manner in which the sector engages with the world. With Nuclear Power being touted as part of the integrated energy in the country, issues of safety are of paramount importance, especially when considering the disposal of radioactive waste. With the move from Light Water Reactor (LWR) to Pebble Bed Modular Reactors (PBMR), new plant design and constructions are critical for addressing safety concerns, and these will require skilled personnel to minimise the related safety risks.

The emergence of renewable energies as well as advancements in the application of electricity grid management technologies will continue to affect operations in the sector. The recent signing of the independent power producers (IPP) contracts by government will also require particular attention with regard to how such contracts are managed, and how the electricity supplied into the grid is accounted for.

In the water sector, application of new approaches to conserving water, rainwater harvesting and treatment of water for reuse are gaining traction. The sector requires new and advanced skills to cope with the new context, and to optimally utilise technological advances in the industry. This implies that learning institutions that provide skills to the sectors should be geared towards imparting knowledge that is relevant to the sector.

3.3 Competition for skills

The Energy and Water sectors rely heavily on skills such as those acquired by engineers and technicians. These are high demand skills for which supply is limited. There is high migration of such skills both within South Africa and across the borders. Some of the professionals with these skills relocate to other countries such as the middle-east (most notably Dubai) and other parts of Africa for the duration of their contracts. Others emigrate and are lost permanently to the country.

Internally, it is well known that people from rural areas migrate to urban centres, leaving the rural areas with fewer people to draw on. Such professionals find it easy to find employment in urban centres.

At the same time, the institutions that train in such skills areas have low throughput rates as shown by data from the Department of Higher Education and Training. Throughput rates at TVET colleges, for example, is very low. It is also widely acknowledged by the employers that graduates from the TVET colleges are of low quality, creating the need for intensive assistance and development upon completing their studies.

Furthermore, there are a number of significant projects in the country that require skilled engineers and artisans, i.e. the Strategic Infrastructure Projects (SIPs); such interventions rely on the supply of skills from training institutions. There are backlogs, especially in the water sector, which require new

approaches to ensure that more people receive access to water. In addition to building new infrastructure, there is infrastructure that is dilapidated which requires either maintenance or replacement. In order to avert a complete collapse of infrastructure, there is a great need for more skills to be deployed in this regard.

3.4 Climate changes

South Africa is a water scarce country, and the drought that is currently affecting certain parts of the country, implies the need for new approaches to addressing the related water challenges. There are thus moves towards recycling waste water and develop desalination plants. At the same time, the sector has to develop additional storage capacity, which has implications for infrastructure development.

Certain parts of South Africa (particularly the Northern and Eastern Cape) are becoming warmer due to climate change. The unpredictable weather patterns affect how energy is produced, stored, and distributed. The sector, especially in the area of water, is faced with the need to find ways of dealing with climate change related challenges whilst at the same time they have to improve and increase storage capacity.

4 Implications for Skills Demand and Supply

4.1 Hard to fill vacancies

These are vacancies (occupations) which employers were either unable to fill within 6 months, or took more than 6 months to find suitably qualified and experienced candidates. The research identified a number of vacancies that were considered hard to fill during the previous 12 months (12 months preceding the study) by the employers. These are:

- ⇒ Plant Managers: There are new power plants that are emerging, and with the move towards renewable energy in the country, there is an insufficient number of experienced candidates to manage such plants as they are different from the traditional power plants.
- ⇒ Business development professionals: These are people who can put together business and commercial deals for companies: This is a skills issue that needs to be addressed.
- ⇒ Enterprise development managers: There are new areas that have been identified by the National Renewable Energy Programme. These positions were not necessarily in existence before.
- ⇒ Solar field operators: Concentrated solar power is new to the country, and is located mainly in remote areas that are not attractive to live in. Skilled people do not apply for jobs in these areas, and local people do not have the skills to operate such stations.
- ⇒ Powerblock operators: These also relate to the concentrated solar power which is new to the country, and is located mainly in remote areas that are not attractive to live in. Skilled people do not apply for jobs in these areas, and local people do not have the skills to operate such stations.
- ⇒ Control room operators:(As above).
- ⇒ Health and safety officers: While there is a relatively good supply of health and safety officers in the country, their quality is low. The location of some of the generation plants also make it difficult to attract high quality candidates to such areas.

- ⇒ Engineers (Mechanical, Civil and Electrical): Competition amongst companies in the sector, companies in the country and from the international markets make these positions hard to fill. Also, salary packages in the private sector are higher, and this creates difficulties for state owned enterprises.

4.2 Skills gaps

In the context of the Energy and Water sector, skills gaps refer to skills deficiencies in employees, or lack of specific competencies, to undertake job tasks successfully, and at required industry standards. These are skills that are critical for a particular function, but are lacking amongst the people currently employed in any one company. Skills gaps is a function of, amongst others, changes in technology, which render certain employees redundant but requiring specialised skills to operate the new/emerging technologies; skills pipeline from the education and training providers (primarily post school institutions), aging of existing employees, and the general health of the current workforce.

The research identified a number of skills gaps that characterise the sector at different levels as follows:

At senior management levels

- ⇒ Problem identification and solving skills
- ⇒ Project planning and management
- ⇒ People management
- ⇒ Strategic thinking
- ⇒ Leadership

At mid level

- ⇒ Solar technicians
- ⇒ Electricians

At lower levels

- ⇒ Computer skills
- ⇒ Telephone etiquette
- ⇒ Plant operators

4.3 Future skills

Based on the change drivers previously discussed, there are a number of skills that were identified by the research as new and emergent in the sector. It must be noted that whilst in some cases there will be completely new occupations, the change drivers point to the changing nature of work across various occupations. Amongst the occupations that considered future skills, or where the nature of work will change significantly, are the following:

- ⇒ Enterprise development managers: New enterprises are emerging in the sector which require skilled enterprise managers.
- ⇒ Socio-economic development managers: Socio economic development refers to the relationship between economic activity and social life. Managers with skills in socio-economic development are required to address the impact of economic development activities on social life in communities.

- ⇒ Wind turbine technicians. This is a new area that requires skills, and is not as dangerous as coal mining. It will thus also provide opportunities for women to enter the energy sector.
- ⇒ Control room operators: Control room operators are generally in short supply and emerging as key future skills, especially in certain geographic areas.
- ⇒ Millwrights (mixed skills artisans): Rural areas are a particular challenge to serve as they are often remote, and present a challenge for the current skills that are available. It is proving extremely costly to send specialists in a particular field to attend to challenges in rural contexts, hence the need to develop artisans who are multi-skilled.

5 Priority education and training interventions in the sector

Based on the findings of the research discussed presented, a number of priority actions were identified in order to respond to the related challenges. These will require further elaboration and planning with clear time-frames and responsibility allocated to relevant areas, but more importantly, these need to be accompanied by the necessary resources to ensure implementation

Scholarships, Bursaries and subsidies targeting Science Technology Maths and Innovation (STEMI):

The sector should avail bursaries and subsidies for young people studying in these subjects with a view to increasing the pipeline from which future engineers and artisans will emerge. Subsidies should be made available for young people who want to improve their technical skills. For example, a subsidy can be made available to a young person who studied as an electrician and incorporate an additional 6 months to a year of study/trainning in order to become a turbine technician.

Scholarships should be made available to increase the skills supply to companies on an ongoing basis.

Skills development programmes for local communities

Geographical areas that are not able to attract skilled people should be prioritised by introducing skills programmes to train local people who can be absorbed into businesses located in the area. The new concept of community colleges as mooted in the White Paper on Post School Education and Training provides ideal opportunity to develop programmes aimed at the local communities.

Control room operator training

This is a general scarce skill in the country, and training is required to produce control room operators to operate plants.

Training on waste water recycling

South Africa is a water scarce country, and there are new technologies emerging to recycle waste water. This requires people to be trained in these technologies so that skilled people can be deployed to perform the related tasks.

Training of desalination engineers

New technologies are emerging to turn the existing water resource that cannot be used currently into useable resource. There is an urgent need to train water desalination engineers to meet the demand that is likely to emerge with the new trends emerging in the water sector.

Database of different categories of skills

The need for a database that can be readily available for the sector which provides details of people with skills in the different categories ((electrical engineers, mechanical engineers, etc.) was identified as an important requirement. Such a database could also highlight training and development programmes on offer.

6 Conclusions

The research revealed that the sector is facing a number of challenges that need to be addressed if they are to provide the services required from them to a wide spectrum of users. Rural areas are particularly challenging when it comes to attracting and retaining relevant skills in order to deliver the required services.

The sector must also respond to the challenges posed by the technological innovations, climate changes and changing policies. Technological changes and innovations are leading to the emergence of new occupations within the sector. At the same time, the skills pipeline remains constricted, coupled with high levels of competition for skills required by the sector. This is compounded by the inability of the training institutions to provide the required numbers and quality of skilled professionals.

The research identified certain priority intervention areas that are required to address the inherent challenges. However, these require further break down into implementable action plans, with timeframes and resources effectively allocated to each area.

References

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Annexure 1

GENERAL INFORMATION <i>(Please provide consolidated information)</i>
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SETA Name	EW SETA
SETA Contact Person for this project	
Submission Date	
Total Number of organisations or companies interviewed	10
Total Number of people interviewed	15
Total Number of Senior Positions interviewed	11
Total Number of Mid-Level positions interviewed	4 (3 Deputy Directors & 1 PM for Upskilling & Training)
Total Number of Lower-Level Positions interviewed	0
Total Number of Small companies covered	1
Total Number of Medium Companies covered	2
Total Number of Large Companies covered	7
Names of sub-sectors covered	Energy (6) Water (4)
Names of Provinces covered	
Limpopo	1
Gauteng	5
Northern Cape	1
Western Cape	1
Kwa-Zulu Natal	1
North West	1

1. HARD-TO-FILL VACANCIES

(Please provide consolidated information)

(1A) List occupations that are Hard-To-Fill Vacancies in the last 12 months		OFO Occupation Code (6 Digit)	(1B) List Reason(s) for these H-T-F-Vs per occupation	
1	Concentrated Solar Power (CSP) Plant Manager	2017-132105	1	These are for the power plants. The renewable energy industry is young in South Africa, there are not a lot of experienced candidates to manage plants that are different to the conventional power plant.
2	Business Development Manager	2017-122101	2	People that can put together commercial deals for companies. That is a challenge not only on the professional side but also because there are no projects available locally. It has been difficult to employ people in this area.
3	Enterprise Development Managers	2017-121301	3	These are new areas that have been identified by the National renewable energy program. These positions had not existed before.
4	Socio-Economic Development Managers	2017-243105	4	[same as above] These are new areas that have been identified by the National renewable energy program. These positions had not existed before.
5	Concentrated Solar Plant (CSP) Plant Process Controller	2017-313106	5	Concentrated Solar Power (CSP) is new to the country. Solar Power is produced mainly in remote areas that are not attractive to live in. Therefore, skilled people do not apply for the available jobs, and local people are not skilled enough.
6	Power Block Operator	NO OFO	6	[same as above] Concentrated Solar Power (CSP) is new to the country. Solar Power is produced mainly in remote areas that are not attractive to live in. Therefore, skilled people do not apply for the available jobs, and local people are not skilled enough.
7	Control Room Operator	2017-631201	7	[same as above] Concentrated Solar Power (CSP) is new to the country. Solar Power is produced mainly in remote areas that are not attractive to live in. Therefore, skilled people do not apply for the available jobs, and local people are not skilled enough.
8	Health and Safety Officers	2017-226302	8	There are many health and safety officers in the country, however, their quality is low. Globeleq once waited a whole year to find the right person. The location (De Aar) also makes it hard to find quality candidates, as it is located far from homes, transportation, and family.
9	Mechanical Engineer	2017-214401	9	Competition with companies such as Sasol and Transnet. Competition with the

(1A) List occupations that are Hard-To-Fill Vacancies in the last 12 months		OFO Occupation Code (6 Digit)	(1B) List Reason(s) for these H-T-F-Vs per occupation	
				international market, particularly Dubai. Salary packages are higher in the private sector.
10	Electrical Engineer	2017-215101	10	Competition with companies such as Sasol and Transnet. Competition with the international market, particularly Dubai. Salary packages are higher in the private sector.
11	Civil Engineer	2017-214201	11	Competition with other companies such as Sasol and Transnet. Competition with the international market, particularly Dubai. Salary packages are higher in the private sector.
12	Environmental Economist	2017-263101	12	Replacement demands; Lack of skilled candidates; Competing salaries with the private sector.
13	Environmental Engineering Technician	2017-311906	13	
14	Chemical Engineering Technician	2017-311601	14	
15	Physical Science Technician	2017-311102	15	
16	Geophysicist	2017-211401	16	
17	Hydrologist	2017-211406	17	
18	Cartographic Survey Technician	2017-311202	18	

2. SKILLS GAPS/TOP UP SKILLS

(Please provide consolidated information)

Broad Occupational Levels	Skills Gaps/Top-Up Skills	List the 3 common skills gaps in the sector at these broad occupational levels
(2A) Senior (managers and professionals)	(2A)1	Problem identification and solving
	(2A)2	Project Planning & Management
	(2A)3	People Management
	(2A)4	Strategic Thinking
	(2A)5	Leadership
	(2A)6	Change Management
	(2A)7	Financial Management
(2B) Mid-Level (technicians, associates, artisans, clerical)	(2B)1	Solar Technicians
	(2B)2	Electricians
	(2B)3	Conflict Management
	(2B)4	Supervising

(2C)	Lower-Level (plant operators and elementary)	(2C)1	Plant Operators
		(2C)2	Computer skills
		(2C)3	Telephone etiquette
		(2C)4	Customer Relations

3. CHANGE DRIVERS

(Please provide consolidated information)

State 3 major change drivers in your sector		Explain its implications for skills development	
(3A) Change Driver One	Policy Context/Changes	(3A)	<p>With the renewable program, there has been a creation of two new specialisations, namely socio-economic development and enterprise development managers. These two specialisations did not exist before.</p> <p>No further facilitation of the program in the past 2 years, therefore the industry has come to a complete stand still. This has left incumbents without any work tasks to perform.</p> <p>companies are not employing and investing in training and development. There is uncertainty with regard to ongoing work.</p>
(3B) Change Driver Two	Climate Change	(3B)	The need to improve storage capacity, with implications for infrastructure. This brings about requirements for increased skills capacity.
(3C) Change Driver Three	Technological Changes	(3C)	New technological improvements bring about the need for new skills.
(3D) Change Driver Four	Competition for skills	(3D)	IPPs face stiff competition for skills from the bigger, more established companies such as those in mining. This requires ongoing training by the IPPs to be able to replace lost skills.
(3E) Change Driver Five	New/Updated regulations at operator level from the Department of Water and Sanitation. E.g. classification of water treatment, classification of plant operators	(3E)	Regulations require operators to continually upgrade their skills/knowledge in order to meet quality standards.

4. FUTURE SKILLS

(Please provide consolidated information)

(4A) List new and emerging occupations in the sector	
1	enterprise development managers
2	socio-economic development managers
3	Wind turbine technicians
4	Control Room Operators
5	Millwrights (mixed-skilled artisans)
6	Environmental Science Engineers

(4B) List new and emerging top-up skills needed in the sector	
1	Occupational health and safety officers
2	Monitoring
3	Industrial Engineering
4	Change Management
5	Technical Report Writing
6	Analysis

5. PRIORITY TRAINING INTERVENTIONS FOR THE SECTOR <i>(Please provide consolidated information)</i>
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List priority training interventions for the sector		Provide reasons	
(5A) Action 1	bursaries and subsidies for young people to add to their skills, particularly STEMI subjects.	(5A)	Any person who studied to become an electrician, can add 6 months to a year of training/education in order to become a turbine technician (new/emerging occupation). The courses are relatively expensive. There still needs to be subsidies for young people who would like to improve their basic technical skills.
(5B) Action 2	Skills Development Programme for local community members	(5B)	Geographical area is not attractive for skilled people, while community members are not skilled enough. Therefore, a training programme geared towards the development of local community members would be appropriate.
(5C) Action 3	Control Room Operator Training	(5C)	In a broad sense, this remains a scarce skills for the entire country.
(5D) Action 4	Scholarship programme	(5D)	To build a pipeline to supply skills to companies on an ongoing basis
(5E) Action 5	Training and Development (Electrical and Mechanical Engineering, Plant Operators)	(5E)	To have a database that can readily fill vacancies as soon as possible.
(5F) Action 6	Training of Desalination Engineers	(5F)	To counter the effects of drought experienced by certain areas of the country.
(5G) Action 7	Training around Waste Water Recycling	(5G)	South Africa is a water-scarce country, therefore, there is a need to find effective ways of recycling water.
(5H) Action 8	Construction Project Management Training	(5H)	This is to ensure the quality upgrade and maintenance of water dams in the country.
(5I) Action 9	Water Resource Quality Management Training	(5I)	The DWS regularly posts new regulations for water quality assurance; therefore, training becomes increasingly important in order for organisations to remain abreast of such regulatory changes.
(5J) Action 10	Financial Management and Budgeting Training	(5J)	Aims to ensure that there is adequate budget for all the training that the Department of Water and Sanitation plans.