

SKILLS SUSTAINABILITY AND GOVERNMENT PLANNING OF FLAGSHIP PROJECTS

Synthesis Report



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Acronyms

ASGISA Accelerated and Shared Growth Initiative

AET Adult Education and Training

BBBEE Broad Based Black Economic Empowerment

DHET Department of Higher Education and Training

ET Education and Training

FET Further Education and Training

HRDC Human Resources Development Council

IDC Industrial Development Corporation

JBWF Jeffreys Bay Wind Farm

JIPSA Joint Initiative for Priority Skills Acquisition

MIG Municipal Infrastructural Grant

PPP Public-Private Partnership

REIPPPP Renewable Energy Independent Power Producer Procurement Programme

SAQA South African Qualifications Authority

SIP Strategic Infrastructural Project

TVET Technical and Vocational Education and Training

VET Vocational Education and Training

1. Introduction

1.1 PURPOSE OF THIS REPORT

The central focus of the proposed research was to investigate, in case-study format, the extent to which skills development was considered and planned for in the construction and development phases of key flagship and other large infrastructure development projects. The case studies also explored the extent to which the approach adopted built a skills eco-system¹ that could be sustained thereafter. The four large scale infrastructure projects selected for this research were:

- The Eskom Medupi Project
- The Ficksburg Bulk Water Supply Project
- The Bombela Gautrain Project
- The Jeffreys Bay Wind Farm Project

In the South African context, government flagship projects, or other large scale infrastructure development projects, can be viewed as the triggers which have enormous potential to lead to the formation of skills systems, and potentially skills eco-systems, in terms of the education and training requirements of these large-scale state-led initiatives. This research project seeks to examine a sample of these flagship and/or large scale infrastructure projects and the extent to which they incorporated planning for skills development and then implemented sustainable skills development strategies, including a skills eco-system approach. The research will therefore provide details of the skill capabilities that were envisaged to support the development objectives of the flagship projects, and the extent to which they had been achieved and sustained after the completion of these projects.

The availability of key skills features centrally in the national discourse and is seen as a critical constraint to growth, infrastructure development as well as service delivery. For example, a recent report cited Malcolm Simpson of the Eskom war room², as saying that, in addition to access to adequate finance, skills constraints were also hampering Eskom's performance. According to the report, "the skills problem extended from management level to supervisors to power plants and artisans doing maintenance..."³ The extent of this challenge is further emphasised in a review conducted under the auspices of the Human Resource Development Council (HRDC) which states that, "despite high levels of investment in skills development over the last decade, there continues to be a strong argument that South Africa suffers certain challenges with respect to the supply of skills as well as an absence of an alignment between national growth imperatives and skills development activities. The risks associated with a poor supply of skills are a common theme in the range of planning frameworks that govern strategies for economic growth including 'The New Growth Path' and IPAP2".⁴

This study therefore seeks to understand the extent to which the flagship and other large infrastructure development projects reviewed are affected by these skills shortages and considers how these projects can contribute to addressing these skills constraints in a manner that both meets the needs of the project and builds a sustainable skills eco-system. It therefore considers the extent to which:

- local skills development has been achieved;
- a balance of skills has been created;
- providers have been able to respond to these skill requirements (or have developed the capacity to respond through the project);

1 Defined under section 1.2 Defining the skills eco-system

2 A strategy think-tank established to seek solutions to the crisis in relation to the electricity supply in South Africa, including issues relating to the construction of the Medupi Power Station

3 News24 (2015) 'Lack of Money, skills plague Eskom', Thomas Hartleib, 04.06.2015.

4 Alignment of Sector Skills Planning to the NGP, submitted By Carmel Marock, Samantha Yeowart and Anthony Gewer, Singizi CC

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- the level of involvement that different role players have had in these processes and the level of coordination that has been achieved; and
 - finally the extent to which these developments serve as a catalyst for further developments.

The study, whilst explicitly skills focussed, also considers the extent to which the projects that were reviewed provided opportunities for those already in employment and/or whether they generated a new set of employed beneficiaries. However, it is noted that this is not the primary focus of this study.

1.2 DEFINING THE SKILLS ECO-SYSTEM

An 'eco-system' (a biological term which has been adapted for a broader audience) describes the 'interdependence of multiple actors in a system', and it therefore follows that a skills eco-system describes "a self-sustaining network of workforce skills and knowledge in an industry or region".⁵ Skills eco-systems are often triggered by some catalyst, which leads to their emergence. They require on-going nourishment throughout their lifespan, a supportive environment, and finally, a high degree of inter-dependence between the parts which make up the system⁶.

The 'eco-system' is wider than the education and training system, and includes a number of public and private institutions such as government at the different spheres, project management and specialist consultancies, development agencies, and the private sector (such as construction and engineering firms). It would also need to take into account both education and training policies as well as broader policies such as the BBBEE codes. The organisations need to work collectively to ensure that the flagship project results in an impact that can be sustained. For example, a new education course at an ET institution, which continues into the future as a resource for the eco-system.

The concept of skills eco-systems, and in particular High-Skills Eco-systems (HSEs), has been posited as a way to ensure that there is synergy between industrial and skills policy. Using cases of the highly successful biomedical and computer hardware and software firms clustered in Northern and Southern California⁷, the four elements integral to both Skills Ecosystems and Natural Ecosystems were described as follows:

- Act as a catalyst to trigger the start of their (and other) development,
- Requires on-going nourishment,
- Offers a supportive host environment, and
- There is a high degree of interdependence among the actors in the system⁸.

Research in skills eco-system pilot projects in New South Wales in Australia⁹ indicates that a number of criteria need to be in place when establishing a skills eco-system. These include:

- Addressing both demand- and supply-side issues, and
- Developing a more relevant and effective system and policy framework to support skill ecosystems

The Australian experience of utilising a skills eco-system approach highlights the importance of ongoing and effective stakeholder engagement, and particularly in getting and keeping the 'right' stakeholders around the table. Some of the key factors in achieving this aim are identified below:

5 Skills in Context: A guide to the skill ecosystem approach to workforce development; NSW Department of Education and Training (2008) p. 5

6 See Finegold, D (1999) 'Creating self-sustaining, high-skill ecosystems', Oxford Review of Economic Policy; 15 (1), pp 60-81.

7 Finegold, D (1999) Creating self-sustaining, high-skill ecosystems, Oxford Review of Economic Policy; 15 (1): 60-81.

8 Ibid p.60

9 Skill Ecosystem National Project Mid-Term Evaluation, p. 2.

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- “Projects need to involve stakeholders with a breadth of experience. This would include people who shape jobs and learning, as well as those representing the interests of those who learn and work in these environments.
 - Participants must have mutual respect, credibility and passion....Recurring themes were the need to engage people with a high profile, capable of influencing policy development (from both industry and VET perspectives), as well as people with hands-on operational expertise. Another theme was commitment and passion for the project.
 - The project must be relevant. This means all stakeholders need to have a shared interest in the outcomes of the project.”¹⁰

This concept of a skills eco-system (as defined in this section) is used to analyse the infrastructure projects that form part of this study with a particular focus on understanding whether these elements are in place, and the extent to which this is resulting in sustainable skills development which in turn is acting as a catalyst to enable job creation and higher level skill formation.

This approach recognises that there are a myriad of other outcomes of infrastructural projects (including of course the impact of the completed infrastructure project itself and the social benefits of access to employment). However, despite the importance of these, they are not within the scope of this review, which focuses on the role that these projects play in terms of the skills development landscape and considers whether, by using the skills eco-system approach, the impact and sustainability of the skills development initiatives could be enhanced, whilst not losing sight of the primary objectives of these projects with respect to meeting infrastructure imperatives to support improved access to services, often coupled with job creation.

10 Ibid p 19

2. Methodology

The methodology employed in the research for this report was, as indicated above, case study based; focussing on interviews with key informants employed by the lead stakeholder organisation and project management consultants. Key informants were also expected to play an important role in providing access to documentation which was not in the public domain, which formed part of the desk review of the research. In addition, the popular press was a valuable source of information for all of the projects, due to their high profile nature.

The cases selected for this introductory project assessing skills issues in infrastructure projects included broad areas of national significance including power supply, water supply and transport. The cases were selected to ensure that the questions posed by the study could be considered in different contexts and sectors. A number of methodological challenges needed to be resolved. These included:

- The information available to researchers was, in certain cases, limited because of confidentiality clauses often related to contractual issues: for example, in the case of Medupi the researcher was unable to talk to the contractors who were ultimately responsible for delivering on the targets. Similarly, in the research on the wind farm project in Jeffreys Bay the non-disclosure agreements required by the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) placed certain limitations on the data that the research team could access. To address this challenge the team sought to interview a wide a range of informants in order to obtain this data through this engagement. For example, in the Jeffreys Bay wind farm case study, interviews were conducted with a range of role players including key informants from the DHET, IDC, South African Wind Energy Association (SAWEA), the Eastern Cape Provincial government, Jeffreys Bay Wind Farm staff on site, Siemens, as well as education and training providers, such as Port Elizabeth (PE) College and Nelson Mandela Metropolitan University's (NMMU) Centre for Integrated Post-School Education and Training (CIPSET) as well as with a PHD researcher at the Centre for Energy Research (CER), University of Cape Town (UCT). Similarly, for the Ficksburg Bulk Water Project, there was extensive data from contractors who were able to account for their experiences in sourcing and utilizing the skills on the project and thus providing a fuller picture of the kind of experiences that were likely to be replicated in the other cases.
- The other constraint related to the absence of institutional memory and as a result where individuals are no longer involved in the project there are gaps in the data with respect to earlier phases of a project. This was a problem with a number of individuals given the nature of the construction industry and the high levels of mobility within this sector. For example in the Gautrain project it was possible to access information about the project from the skills development specialist based at the head office, but it was more difficult to access those individuals who had been involved at a project level. However, interviews, undertaken with a range of role players, helped to mitigate this challenge.

2.1 ALIGNMENT WITH THE 18 SIPS

The evaluation of existing flagship projects should take note of the development of a further 18 Strategic Infrastructure Projects (SIPs), led by the Department of Economic Development, and Minister Ebrahim Patel. This is especially important since it is anticipated that some of these SIPs will create new flagship projects in the future. Hence, the lessons learnt from existing flagships could be of great value in formulating and implementing future projects. The following list reflects the current 18 SIPS:

18 STRATEGIC INFRASTRUCTURE PROJECTS (SIPS)

Geographic Strategic Integrated Projects

1. Unlocking the northern mineral belt through rail infrastructure and logistics development to connect Mpumalanga and Gauteng.
2. Durban-Free State-Gauteng logistics and industrial corridor has strengthened the logistics and transport corridor between South Africa's industrial hubs.
3. South-Eastern mode and corridor development will develop the N2 Wild Coast highway, thus improving access into Kwa-Zulu Natal and manganese rail capacity from the Northern Cape.
4. Unlocking the economic opportunities in North West Province.
5. Saldanha-Northern Cape corridor development strengthening marine support capacity for oil and gas and through the expansion of iron ore mining production.

Spatial Strategic Integrated Projects

6. Integrated municipal infrastructure projects: This will address the development of least resourced districts to curb all the maintenance backlogs and upgrades required in water, electricity and bulk infrastructure (including road maintenance).
7. Integrated urban space and public transport programme: co-ordinates the planning and implementation of public transport, human settlement, economic and social infrastructure.
8. Agri-logistics and rural infrastructure SIP will improve investment in agricultural and rural infrastructure.

Energy Strategic Integrated Projects

9. Green energy in support of the South African economy: This SIP will support sustainable green energy initiatives on a national scale through clean energy options.
10. Electricity generation to support socioeconomic development and addressing historical imbalances.
11. Electricity transmission and distribution for all by expanding the transmission and distribution network to address historical imbalances.

Social Infrastructure Strategic Integrated Projects

12. Revitalisation of public hospitals and other health facilities by building and refurbishing hospitals and other public health facilities.
13. National school building programme is driven by replacing inappropriate school structures, addressing basic services backlog and provision of basic services under the Accelerated School Infrastructure Delivery Initiative (ASIDI).
14. Higher education infrastructure addresses infrastructure development for higher education, focusing on lecture rooms, student accommodation, libraries and laboratories, as well as ICT connectivity.

Knowledge Strategic Integrated Projects

15. Expanding access to communication technology by providing for broadband coverage to all households by 2020 by establishing core Points of Presence (POPs) in district municipalities, and extending new Infracore fibre networks.

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16. SKA &Meerkat Projects – SKA is a global mega-science project promoting an advanced radio-telescope facility linked to research infrastructure and high-speed ICT capacity.

Regional Strategic Integrated Projects

17. Regional integration for African cooperation and development: addresses the participation in mutually beneficial infrastructure projects to unlock long-term socio-economic benefits by partnering with fast-growing African economies with projected growth ranging between 3% and 10%.
18. Water and sanitation infrastructure: The project will involve provision of sustainable supply of water to meet social needs and support economic growth.

2.2 DESCRIPTION OF THE CASES THAT WERE SELECTED

2.2.1 The Eskom (Medupi) Project

The construction of the Medupi Power Station in Lephalale, Limpopo Province began in 2007. Eskom's build programme is part of the Integrated National Electrification Programme (INEAP), and is in line with the Energy White Paper. In line with a decision made by the National Electrification Advisory Committee (NEAC), which was established to prioritise redress as electricity supply expanded, to respond to backlogs with a rural bias and align with the other national and local initiatives that were in place at the time, including the Integrated Sustainable Rural Development Strategy (IRDS) the Nodal Zones, the Integrated Development Plan and the Municipal Integrated Development Plans (IDPs).¹¹

Medupi was a component of their 'Capital Expansion Programme', which was expected to increase South Africa's additional supply requirements by 17120 MW, and to respond to the projected requirement of 45000 MW by 2030. This represents more than double the supply at the time. It was anticipated that in 2011¹² Medupi would contribute 4 764 MW, and Kusile 4 800 MW. Thus together these stations were expected to contribute around 56% of the additional capacity (9560 MW of the 17120MW). As the first power station to be built in a post-Apartheid South Africa, its supercritical boilers and turbines are expected to operate at higher temperatures and pressures than Eskom's other stations, and reduce water usage by using direct dry-cooling method.

Broadly understood as an imperative to induce national beneficiation, the project was designed to include local content (in excess of 50% of local content directly benefiting the SA economy), employment creation (in excess of 40 000 jobs created), infrastructure development (roads and railways) and regional development that would result from spending and investment in local areas. The extent of the project is significant. It was reported that a team of more than 2 500 engineering, project management and commercial resources, were supplemented by 19 local and foreign engineering and project management companies, contracted 'over the next ten years' working full-steam on the build programme¹³. However, the Medupi Project has been beset by a number of delays, and is already four years behind schedule: the project has been associated with backlogs and financial over-runs and is mired in a host of labour-related turmoil, which is in part attributed to issues relating to the absence of sufficient levels of skills development.

There has recently been a great deal of attention to Eskom because of power shortages resulting in forced outages, referred to as 'load shedding' and appeals to Eskom's consumers to reduce electricity consumption. The impact of the Medupi project having not being rolled out on time has therefore become a matter of national concern.

11 Source: Eskom presentation to the select committee on labour and public enterprise, 22 June 2011.

12 This included an expansion programme that included Return to Service (RTS) projects and 'Renewables', water based power and range of refurbishments of existing facilities in Mpumalanga.

13 from <http://www.eskom.co.za/Whatweredoing/NewBuild/Pages/New_Build_Programme.aspx>

2.2.2 Ficksburg Bulk Water Supply Project

The Ficksburg Bulk Water Supply project links to SIP 6: Integrated Municipal Infrastructure Projects, which are intended to 'address the development of least resourced districts to curb the maintenance backlogs and upgrades required in water, electricity and bulk infrastructure'. This specific project assumed national profile after the death of Andries Tatane during service delivery protests in Ficksburg in April 2011, during which the shortage of water to the community was highlighted. Although the bulk water supply project was initiated by the Setsoto¹⁴ administration in place at the time of service delivery protests it was fast tracked by the new administration¹⁵ appointed by the Free State Provincial government in the wake of the suspensions and resignations of the previous municipal officials. As noted above, the lack of water was one of the key flashpoints leading to the protests. In terms of the Water Services Act, the responsibility for ensuring access to water services lies with water services authorities (municipalities). It is the responsibility of water services authorities (through water services providers) to ensure access to both water supply services and sanitation services."¹⁶

The problem with the supply of water to Meqheleng (the township in Ficksburg) was a classic example of apartheid planning, compounded by a lack of maintenance and prioritisation by the post-apartheid municipality. The reservoir which supplied water to Meqheleng was fed, through gravitational pull, from the reservoir which supplied Ficksburg. This meant that, for the Meqheleng reservoir to be supplied, the main Ficksburg reservoir needed to be above a certain threshold capacity. The growth of Ficksburg itself, coupled with a lack of infrastructure maintenance, meant that the main reservoir seldom reached the necessary capacity, which meant that the Meqheleng reservoir was seldom filled, with the area often experiencing disruptions in supply. This resulted in not only a very sporadic water supply in Meqheleng, but also in a distortion in supply leading to a situation where the 'town' had water and the 'township' did not, which to a large extent explained the protest. As the new Municipal Manager pointed out, "I don't condone looting and all the other issues that accompany demonstrations, but I understand why the people of Meqheleng took to the streets.... Their concerns were legitimate. They wanted and have a right to clean water..."¹⁷

The contract for the improvement of the bulk water supply was issued by Setsoto Local Municipality, and was managed internally by the Head of Engineering Services. Setsoto appointed Aurecon as the external project manager for the construction, and then various aspects of the construction were implemented by Swanns, Procure and Ruwacon. The R63million¹⁸ project was funded through the Municipal Infrastructural Grant (MIG) mechanism designed to assist municipalities to provide basic services.

2.2.3 Bombela Gautrain

The Gautrain Project is a component of the integrated transport system. As the Gauteng Transport MEC pointed out in a press statement in October 2014,

With a range of strategic economic infrastructure projects like Gautrain concluded and underway, the priority remains the strengthening of Gauteng's integrated transport system.... It is essential that we get this system

14 Setsoto is the municipality responsible for the town of Ficksburg and its township of Meqheleng.

15 In May 2011, four senior officials of the Setsoto Municipality, including the Chief Financial Officer, Planning and Infrastructure, Technical Services community economic development and corporate services, were suspended after the task team found they had "neglected their duties" which resulted in service delivery backlogs.

16 Water Supply and Sanitation in South Africa Environmental Rights and Municipal Accountability, p. 2

17 <http://www.citypress.co.za/news/signs-of-change/> accessed 22/4/2015

18 Increase in capacity of water treatment works (R23 million), Construction of clear water supply line (R20 million) and Construction of reservoir (R21million) (Interview: Setsoso Municipality, Feb. 2015).

right. It should make public transport more accessible, convenient and affordable and reduce travelling times as well as provide spin-offs that will lead to further investment in public transport.¹⁹

The Gautrain is a component of a comprehensive Gauteng public transport system incorporating a network of alternative public transport mechanisms, including all subsidized public transport services, the municipal bus operators such as Metrobus and Pretoria City Transport, the proposed new Bus Rapid Transit Systems (BRT)²⁰ for Johannesburg and Tshwane, Gautrain bus feeder systems and the Wits and Tshwane Metrorail services.

The project is intended to provide a safe, efficient and reliable service to commuters in Gauteng. It is a Public-Private Partnership (PPP), between Government and the Private sector, and included a 15-year maintenance and operating contract period after construction. Undertaken by the Gauteng Province with a range of government entities involved, including the National Treasury, the construction and operating responsibility for the project was awarded to the Bombela Concession Company, and announced officially on 5th July 2005. The consortium initially consisted of Bombardier, Bouygues Travaux Publics, Murray & Roberts and Strategic Partners Group. The operations were led by RATP Development (the transit operator responsible for public transport in Paris and its surroundings) in partnership with SPG and Murray & Roberts, with construction officially commencing in September 2006.

Key features of the project include²¹:

- 20 year Concession period
- 80kms of railway line, 15 km underground
- 10 stations linking Johannesburg, Tshwane and OR Tambo International Airport (ORTIA)
- 24 trains with four train coaches will each transport at least 130 000 expected passengers per day at opening of the system
- Trains will travel at speeds of up to 160 km/h
- Travel time: 42 minutes for Johannesburg-Tshwane, 15 minutes for Sandton-ORTIA
- About 36 dedicated bus routes will be available at the stations
- 125 buses will operate on 430 km Gautrain bus route.

2.2.4 Jeffreys Bay Wind Farms

The Jeffreys Bay Wind Farms (JBWF), located in Jeffreys Bay in the Kouga Municipality in the Eastern Cape, is one of the largest wind farms in South Africa to date. It has a 20 year power purchase agreement with Eskom, with an implementation agreement with the Department of Energy (DoE). JBWF consists of 60 wind turbines on 3 700 hectares and generates 4600 MW per year, enough clean, renewable electrical energy to meet the needs of 100 000 average South African households.²² To get a perspective on the nature and scale of work undertaken, it included 'transportation of 22 500 tons of turbine components, construction of 48km of roads, laying of 200km of cables and 26 800m³ of concrete for the 60 turbine bases and the erection of 60 wind turbines, each standing 80m tall'²³

19 http://www.gautrain.co.za/newsroom/2014/10/transaction-advisors-for-proposed-gauteng-rail-extensions-appointed/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+Gautrain-Newsroom+%28Gautrain%27s+Newsroom%29

20 The quite vehement agitation by taxi drivers against the introduction of the BRT in Johannesburg, almost according to one respondent threatened to derail the entire integrated transport ideal.

21 Gautrain Facts at a Glance, Gautrain Management Agency (GMA), 2014, p. 4

22 www.jeffreysbaywindfarm.co.za, accessed 11th March 2015

23 www.jeffreysbaywindfarm.co.za, accessed 11th March 2015

JBWF is managed by a consortium led by Globelec²⁴ (the Operations management company) and Siemens (Operations and management contractor). Construction began in December 2012, and the first wind turbine was erected in July 2013, with all 60 erected in February 2014 and Commercial Operation Date in May 2014.

As a Renewable Energy (RE) project, the JBWF shows how skills development is being implemented in a new technology sector, designed to respond to a critical sector of the economy. The following technologies qualify as RE: onshore wind, concentrated solar thermal, solar photovoltaic, biomass solid, biogas, landfill gas, and small hydro²⁵.

24 Project investors are: Old Mutual, Thebe Investment Corporation, Mainstream Renewable Power and the AmandlaOmoya Trust (6%), Enzani Technologies and Uziso Engineering.

25 An initial target of 3 725 MW has been set, of which wind (1850MW) and Solar (1450MW) is expected to make up the bulk of the alternative energy supply. A second Ministerial Determination in 2012 specified an additional amount of 3 200 MW.

3. Findings

3.1 BROADER NATIONAL POLICIES DRIVING SKILLS DEVELOPMENT

It was found that skills development often represents a component of the beneficiation within the wider project design. This emphasis on skills development within the project is typically encouraged by wider policies that frame the project and these findings consider the extent to which this ensures that skills are planned for at the conception of the project and are then monitored throughout the implementation of the project.

In the case of Medupi, the project was conceptualised within the context of the implementation of ASGISA (Accelerated and Shared Growth Initiative of South Africa). ASGISA had a strong emphasis on skills development and the recognition of the extent to which skills shortages were acting as a constraint to development and growth. This led to the establishment of JIPSA (Joint Initiative on Priority Skills Acquisition). JIPSA focused on ways to address blockages to skills development and included a particular focus on engineering and artisan related skills. It also considered the requirements of infrastructure projects more widely. ESKOM was a key player within JIPSA and therefore generated skills targets for Medupi that referenced the imperatives highlighted by ASGISA and the wider skills targets agreed upon in JIPSA.

These targets, termed 'ASGISA targets' by role-players interviewed for this study, were built into the procurement system. Contractors were required to commit to a range of skills development targets and in particular had to indicate the number of artisans that were to be developed during the course of their contract. The table below illustrates one example of the type of targets that was written into a contract with one of the contractors:

TABLE 1: EXAMPLE OF THE TARGETS OF ONE CONTRACTOR

TRADE/OCCUPATION	ASGISA TARGET	NO OF INTAKE		QUALIFIED	IN TRAINING	DROP -OUT	TERMINATIONS (POST QUALIFYING)
		Overall Intake	Intake -Less drop-outs				
Pipe Fitter	180	196	184	182	2	12	51
Fitter	30	41	32	32	0	9	17
Total	700	817	749	650	99	68	194

Source: Eskom (2014)

* Figures are indicated for one contractor rather than the entire Eskom/Medupi project

These targets then formed the basis for subsequent monitoring of the contractors. The progress reports against these targets formed the skills development component of this project. In terms of this contract it was reported that the total number of artisans (700) were trained as part of this initial commitment which was the result of a total intake of 817, with 68 dropouts recorded since inception. This example highlights the importance of wider policy integrating skills development as a requirement: it ensures that skills development is built into the design of the project and that there is a strong focus on the monitoring of implementation against these targets. However, there have been some concerns about the way in which ASGISA targets are interpreted, and a view is posited that the focus on quantitative number crunching of the skills developed, has been less helpful in the skills planning debates (see for instance Akoojee and McGrath, 2008). The supply driven perspective needs to be complemented by the demand for, and the utility of, the skills developed.

Similarly it was found that, in the Gautrain project, the recruitment strategy was also in line with ASGISA, which referred to a skills shortage that was negatively impacting on key national objectives – for instance, the need to “...achieve a

6% annual economic growth by 2010 and halve poverty and unemployment by 2014” (The Presidency, 2007)²⁶. This also led to certain targets being set within the project to support these wider imperatives.

In the example of the Jeffreys Bay Wind Farm project, it was found that developments were framed by the national policies on Renewable Energy (RE). The White Paper on RE Policy of the Republic of South Africa (2003) defines RE sources as “sun, wind, biomass, water (hydro), waves, tides, ocean current, geothermal, and any other natural phenomena which are cyclical and non-depletable,” and commits South Africa to a target which stipulates that 4% of SAs estimated electricity demand (41 539 MWs) should be generated from renewable sources by 2013. This was further consolidated by the Department of Energy’s 2011 *‘Integrated Resource Plan 2010-2030’* (IRP), which is to guide the country’s energy generation until 2030 and ensure that there is a more diversified energy mix with less reliance on fossil-fuels, greater levels of energy efficiency and optimising the potential of RE.

The flagship wind farm project is located within the government’s Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), which is designed to manage the bidding and procurement for the RE industry in the country. Like all infrastructure projects, it is intended to contribute towards socio-economic and environmentally sustainable growth. A number of national stakeholders are involved in the REIPPPP. The key energy regulatory bodies are the DOE, Eskom and National Energy Regulator of South Africa (NERSA). Various other government departments include the Department of Economic Development, the Department of Trade and Industry and the Department of Environment Affairs.

Further skills planning in the wind project is shaped by the work on skills development being undertaken within the Strategic Infrastructure Projects (SIPs), outlined in Section 3 of this report. The JBWP relates to *SIP9: Green Energy in support of the South African Economy*, which aims to support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the IPR2010 and to support bio-fuel production facilities.

However, in relation to municipal infrastructure projects, and specifically the awarding of Municipal Infrastructure Grants, it was found that the emphasis was on creating local employment opportunities rather than on linking those employment opportunities with skills development (the current MIG Policy Framework²⁷ does not make any mention of skills development or training.)

3.2 LOCATING SKILLS DEVELOPMENT WITHIN A PROVINCIAL/REGIONAL CONTEXT

The previous section considers the extent to which national policies ensure that skills development is planned for in flagship projects, and the extent to which emphasis is placed on the monitoring and evaluation of these targets. A critical element of a skills-ecosystem is the extent to which these plans have a regional dimension: that is that they are planned taking into account regional resources and constraints.

As indicated above, the wind project is driven and shaped by a number of national imperatives. These policies and programmes recognise, however, that both provincial and local governments are critical to the successful roll-out of the REIPPPP²⁸ and therefore considerable energy has been spent on ensuring that the initiative is owned by regional role players and that a collaborative approach is taken to ensure the success of the initiative.

As a result of the emphasis on provincial and local government’s involvement, the Eastern Cape has become a champion of the RE industry. The vision for the province is that ‘the Eastern Cape should provide the most enabling environment

26 The Presidency (2007) JIPSA Report, Pretoria

27 Policy Framework for the Introduction of the Municipal Infrastructure Grant (MIG)

28 On 16th April 2015, the Minister of Energy announced an expansion and acceleration of the REIPPPP

for sustainable energy investment and implementation in the country. Of the twenty-three wind farm developments that were awarded preferred bidder status (in bid windows 1 to 3), twelve (approximately 50%-976MW) were awarded to the Eastern Cape, with an additional three awarded in April 2015. The province has established a dedicated website for sustainable energy, greenenergy.ec.co.za.

Provincial support for the RE skills initiative is provided at the highest level. The province has included skills development in RE as an important component of its overall developmental strategy and the REIPPPP requires that wind farms spend 1.5% of turnover on Skills Development and Economic Development. JBWF is spending a quarter of this 1.5% on skills development, including R4 million per year on bursaries and training technicians.

The Eastern Cape Sustainable Energy Forum (SEF), chaired by the Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) and the Green Skills Forum (GSF)²⁹, chaired by the Office of the Premier (OTP) were established to maximise the benefit of skills development within RE initiatives. These forums ensure that, as RE projects are implemented, the development of skills is considered, and critically that the public institutions of learning within the province are involved in the process and are able to adapt their programmes to meet the needs for skills within the RE programmes. Both are multi-stakeholder forums and reflect the importance of the skills development in this area. GSF has had 4 meetings, the last being on 16th April 2015. Reports from these forums suggest that progress is being made in key issues pertaining to wind power and skills.³⁰

This example suggests that where national policies frame the project but there is strong regional ownership of the project in a manner that involves key role players – as is consistent with a skills eco-system – there is the potential to realise important successes. According to the South African Wind Energy Association (SAWEA), in less than four years South Africa's wind sector³¹ has grown into a R55 billion industry with approximately 5000 people working in the industry at the time the fieldwork was undertaken. Further opportunities for industrial development to support the growing RE industry in South Africa through manufacturing are being actively promoted by the Eastern Cape Province, through the Coega Industrial Development Zone (IDZ) located next to the deep-water port of Ngqura, the East London IDZ with its Science and Technology Park and the Eastern Cape Development Corporation. Critical to this project, the study found that there have been important successes with respect to skills development, including the capacity development of learning institutions and the provision of training to address key imperatives (these are discussed in more depth in this report). The study also found that there were challenges with respect to lower level skills development and this is explored further in this report.

The Gautrain provides another example of a project firmly located within the Gauteng Province, which takes forward the developmental objectives of the South African state. The Gauteng Provincial Government was the key entity involved in driving the project from its inception in 1999 to its finality.

Although the province makes up only 1.42% of South Africa's land area, it comprises 23.7% of the country's population (12.27 million people), serves as the economic hub of the country, and is a leading economic centre in Africa. In February 2000, the Gauteng Provincial Government formally announced the decision to build Gautrain as 'a new rapid rail system'. The network would link Johannesburg, Pretoria and the (then) Johannesburg International Airport (the current OR Tambo International). This followed a pre-feasibility study completed in 1999. The conceptualisation report was presented to Gauteng Cabinet in June, 2000.

29 The GSF, which feeds into both the Provincial Skills Development Forum (PSDF) and the SEF consists of various stakeholders including: Independent Power Producers, Eskom, logistics managers, manufacturing companies, SIP 8 project team, national, provincial and local government departments and entities, IDZ's, universities based in the province, provincial TVET colleges and private providers, SETAs, organised labour, and agencies such as GIZ.

30 This is based on an extract from the GSF Report of 16th October 2014

31 The cost of wind power has come down with the latest projects producing electricity at approximately 40% less than Eskom power from Medupi.

The construction of the Gautrain system became one of the ten Spatial Development Initiatives (SDI) projects of Gauteng Province. SDI projects have, as one of their goals, the stimulation of economic growth in the province and provision of employment opportunities. Other SDI projects include the Johannesburg International Airport Economic Zone, the Innovation Hub of the CSIR and the University of Pretoria, and the Automotive Cluster north of Pretoria. The project was promoted as central to the plans for the World Cup (2010) and it was suggested that the very real possibility of the airport-city rail link was an opportunity to showcase the development of the country, outside of the very immediate concerns of transporting spectators to the stadiums. Thus it was pointed by the Premier that the,

...project will not only resolve many of the transportation problems in the areas it serves, but will also stimulate economic growth, development and job creation. It will also transport tourists, spectators and participants to the 2010 Soccer World Cup events in Gauteng. It will be a facility and service that will be to the benefit of all the people of Gauteng.³²

The following Provincial objectives were identified for the project:³³

- To stimulate economic growth, development and job creation.
- To alleviate severe traffic congestion in the Tshwane – Johannesburg corridor.
- To achieve the Province's goals with regard to SMEs, tourism, BEE, etc.
- To promote the use of public transport.
- To improve the image of public transport and attract more car users to public transport.
- To promote business tourism through the link between Sandton and JIA.
- To significantly contribute towards urban restructuring, shortening of travel distances and improving city sustainability.
- To provide a link(s) to the Tshwane Ring Rail Project – linking Mamelodi, Atteridgeville, Soshanguve and Mabopane.
- To stimulate the renovation and upliftment of the Johannesburg and Tshwane CBDs.
- To link the main economic nodes in Gauteng with JIA.
- To comprise a holistic transport plan and network for Gauteng.

Of interest is that, in this example, the Province took ownership of the project and there was involvement from role players from different sectors. It also suggests that whilst skills development was not a key objective initially, this was then added and became important to the project objectives as illustrated by the following statement made in 2008:

Gautrain's training initiatives to develop skills and build capacity are proof of the project's commitment to sustainable socio-economic development in Gauteng, the province of Gold.³⁴

The MEC also pointed out that, in the 'latest' SED brochure, "...we are proud to release what we have achieved so far with regard to skills development, participation by BEE enterprises and individuals and job creation as well as capacity building (Gautrain Management Agency (GMA), 2014, p. 1).

The social development objectives were not only expanded but became more effectively articulated as the project proceeded - most likely the result of the concerns expressed when these were not articulated and addressed. Objectives that were included were, 'renovation and upliftment' and 'economic growth, development and job creation.' This reportedly resulted in a number of social benefits which were reported in the 2008 SED brochure as follows:

32 Cited in <<http://www.gautrain.co.za/newsroom/2003/03/gauteng-provincial-government/#sthash.1F9GW2bz.dpuf>>

33 As announced by the Premier on 2nd July 2005 as part of the process of announcing the preferred bidder

34 Quoted in <<http://www.gautrain.co.za/about/sed-delivery/training/gautrain-skills-training-exceeds-initial-targets/#sthash.BrybihRK.dpuf>>

FIGURE 1: SNAPSHOT ON PROGRESS OF SED ACHIEVEMENTS RECORDED

PROGRESS THUS FAR	
<p>JOBS CREATED</p> <ul style="list-style-type: none"> • 11 000 direct jobs • 63 200 direct, indirect and induced jobs • Companies benefited include: <ul style="list-style-type: none"> - 260 BEEs (R1 900 million) - 90 New BEEs (R800 million) - 230 SMMEs (R600 million) 	<p>TRAINING</p> <ul style="list-style-type: none"> • 10 400 courses for unskilled/semi-skilled staff • 1 250 courses for management

Source: (Gautrain Management Agency (GMA), 2014, p. 2)

Skills development is mentioned in various reports and is subsumed under various categories including ‘Human Resource Development’, ‘localisation’ and ‘equity targets.’ It has also incorporated elements of BEE, development of small, medium and micro enterprises, the sustainable development of underprivileged communities and under the broad ambit of ‘maximisation of local content’³⁵. In addition, the Gautrain project was able to secure R23 million from the National Skills Fund for training 2100 learners. In total, 2357 individuals were reportedly trained, 9705 training interventions/assessments undertaken, and 352 people undertook the Learning Ability Battery Assessment. Three (3) apprentices started electrical training at the NECSA centre.

While skills development was clearly an articulated objective of the project, the sustainability of the skills development component in this project has been questioned. Public providers were not utilised and few providers exist that undertook the initial training. There is little evidence that a skills ecosystem has been sustained as a lasting legacy of the project.

3.3 GRAPPLING WITH THE TENSIONS RELATED TO A LOCAL DIMENSION

As noted above, most large infrastructure projects have as a requirement that there is ‘local’ socio-economic benefit associated with the project. The study found that projects had differing notions of what was meant by ‘local’, with some projects indicating that local meant that South Africa as a whole should benefit, while others suggested that local meant benefit to the particular community in which the project was being implemented.

In the Medupi example it was found that the project distinguished between local (local-to-site) and national. The local to site is understood as those having direct impact on the immediate locality, i.e. Lephalale. Thus one report records that by 2011, 58% of the total project cost was spent locally (i.e. in Lephalale), and circa 84% of total Civil Contract spending having been spent in the country. This was achieved through procurement procedures that reinforced a number of targets (including skills development) that needed to be met on a range of indicators.

Hitachi³⁶, the majority contractor that was awarded close to R38 million of the contract, referred to the importance of localisation as an important part of its contractual obligations: “Our main focus is the successful execution of the projects and the fulfilment of the ASGISA contract obligations.³⁷ These obligations call for 60% local content, preferential procurement and substantive skills development and investment in South Africa. These contracts were expected to

35 See more at: <http://www.gautrain.co.za/about/sed-delivery/job-creation/gautrain-delivers-on-job-creation-promises-to-fight-poverty/#sthash.C0pMguu7.dpuf>

36 A major part of the contract was given to Hitachi, at R21bn.

37 CEO, Johannes Musel, quoted in <<http://www.politicsweb.co.za/politicsweb/view/politicsweb/en/page72308?oid=238144&sn=Detail&pid=72308>>

benefit local industry through know-how transfer and skills enhancement in a highly specialized engineering field.” The success of these engagements, both with respect to Hitachi and other contractors, had not been evaluated by the time this study was undertaken. What is notable though, is the success that the project has had with respect to job creation. Reports indicated that job creation was initially expected to peak at 8 000 direct jobs during construction but that in reality there were close to 14 000 individuals reporting to site, with jobs also having been created in the development of supporting infrastructure, including the large new Grootegeluk coal mine, roads, housing and sewage works construction. One of the project managers observed that,

....once construction work has concluded in 2015, Eskom will not only have boosted the country’s power generation capacity by 4,800 MW using the latest power generation technology; it will also have played a significant part in strengthening the local community and boosting job prospects for a considerable section of the population³⁸.

However there was a recognition that many individuals, who were from the local area and had been employed in the project, were left without work as phases of the project were completed and despite reports that indicate that skills development occurred on an enormous scale in this area³⁹, many of these now unemployed individuals did not appear to have the skills required to access new employment opportunities. This meant that there were large numbers of now unemployed individuals in the local area for whom plans had either not been made, or had not been effectively implemented. As a consequence, and after much negotiation between the role players, the Medupi Legacy Initiative was designed in 2012. It was recently awarded Presidential Project status as a pilot initiative of national importance and was given the necessary support to increase the potential impact of the work. The intention of this initiative was to create a ‘well-coordinated and integrated programme’ and its objectives were to enable the Medupi power station project to leave a ‘sustainable legacy’ in the Lephalale municipal area and Waterberg District Municipality, which would contribute to the Limpopo Provincial Gross Domestic Product. The main initiatives within the MLI were identified as:

- To equip the local Lephalale FET College to be able to provide substantially more skills development opportunities in relevant work related areas.
- Redeploy a number of demobilised constructed staff to the Drylands project, which focuses on sustainable land management and developing a biodiversity rich rural green economy.
- Aggregate and co-ordinate Corporate Social Initiative (CSI) initiatives of MLI participants.

The activities of the MLI, which were crafted after months of stakeholder deliberations, were underpinned by six Value Propositions (VPs) categorised into two focus areas, namely:

- Job Opportunity VPs – which aim to offer job opportunities through initiatives such as the Drylands, Medupi Corporate Social Investment (CSI) projects, and the Lephalale Local Municipality (LLM) infrastructure projects
- Enabler VPs – which aim to equip beneficiaries with improved skills to navigate their way to better self-management, future employment or business ownership through VPs such as the Life Skills, Further Education and Training (FET) and the Small, Micro and Medium Enterprises (SMME) support processes.

This recognised that whilst the project has clearly benefitted Lephalale in terms of infrastructure, the continued development and the ability of individuals to re-enter the labour market in these areas will be dependent on the effective implementation of additional economic opportunities that have been identified. The legacy programme has also effectively begun to implement more of the elements of a skills-ecosystem approach in that it is engaging local role players in this discussion and is focusing on ways to ensure that the public TVET provider has the capacity to continue to play a role in skills development, even once the project is complete.

38 Pasted from <http://www.eskom.co.za/Whatweredoing/NewBuild/MedupiPowerStation/Pages/Good_News_Stories.aspx>

39 Pasted from <<http://www.eskom.co.za/news/Pages/MedupiMinister.aspx>>

In the case of wind farms, it was found that, despite the strong provincial ownership of the project, the “local community feels disconnected. despite the various efforts made by JBWF⁴⁰ and the establishment of a Community Trust as part of the bid process. This challenge has been recognised by the JBWF and efforts are currently being made to secure additional trustees from the local community.

With respect to local job creation in the JBWF, it was found that within the construction phase the number of jobs varied according to what was being undertaken but that at the height of construction in August 2013, there were 602 people working on site, of which 45% were from the local community. However, the extent of training provided to workers during this phase by the contractors was not clearly planned for or recorded. One possible reason for this was provided by several key respondents in this study who tended to concur with a recent report, prepared by Altgen Consulting (Nov 2014)⁴¹, which points out that: “Most employment opportunities created in the communities surrounding the projects, defined as local communities within a 50 km radius surrounding the IPP, are low skilled, unskilled and temporary.”

In the Ficksburg Bulk Water Supply project it was found that there was a strong focus on local labour utilisation but very little on the skills development of local labourers. As one contractor noted, “...these projects are about employment rather than skills”. Although for this project, all contractors interviewed indicated that they provided training to the local labourers, the ‘on-the-job’ training in basic skills was often ‘uncertified’ or, at best, acknowledged with a letter of reference specifying that the individuals had worked on the project and detailing the tasks undertaken.

It was noted that the perception of the kinds of skills required for the project were very limited. As one interviewee pointed out; “How much training do you have to give a guy who’s going to dig a ditch?” Even in areas where traditionally higher skills were needed, such as formwork, respondents in the study suggested that new technology means that “you can teach someone what they need to do in about half an hour.”

In the Gautrain project, it was found that the decision to locate the local assembly of Gautrain was linked to the objective of creating, “...an enabling environment for economic growth.” The Union Carriage and Wagon Partnership (UCW) in Nigel was established with an investment of R15 million, of which R5 million was to be used for human resource development. This initiative not only created a number of local jobs but provided opportunities for skills development. The plant employed 95 new people mostly from the local area. These included 13 women as quality controllers, supervisors and assemblers. In addition, it employed two disabled employees and took on three learners. The project also saw 17 employees being sent to Derby (UK) where 15 rail cars were being manufactured at Bombardier Transportation Workshop. Further, different training and assessment providers were formed into a joint venture to undertake training at the site and at the Bombela training centre, so that local employment could be enhanced.

It was also reported that as part of the Concession Agreement, Bombela CJV has committed to skills training and development, as well as women’s learnership and mentorship⁴².

3.3.1 Worker recruitment and skills

One dimension of local employment pertains to the selection and recruitment of individuals onto these projects. This is managed very differently depending on the nature of the skills required as illustrated by the projects.

In the water project in Ficksburg, the labour recruited locally was of a ‘largely unskilled’ nature, with the more specialized work being undertaken by those outside of the locality. In the case of the Ficksburg Water Project, the process of

40 Interview with project managers

41 Report entitled, ‘Renewable Energy and Energy Efficiency Career Pathways’ (Altgen, 2014)

42 <http://www.gautrain.co.za/about/sed-delivery/job-creation/gautrains-initiatives-enlarge-skills-database/#sthash.Jmw5upGx.dpuf>

sourcing local labour was undertaken by a Community Liaison Officer (CLO), who was appointed and paid by the contractor for the duration of the contract. The contractor identified the number of people required and indicated the broad categories of jobs/tasks for which they were required. Importantly, the selection from the list provided by the CLO appeared to be fairly random and not necessarily linked to skills already acquired or the ability to acquire skills. One contractor indicated that they simply took the list of people that they were given by the CLO and selected as many as needed, another indicated that they randomly picked ID numbers on the list to make the selection.

Another contractor did however indicate that they did check whether the candidates had the experience for the job before they were 'shortlisted' indicating that, "We still try to do some assessment – if we need 5 people we say bring us 10 or 15 and we try to choose the best, but the pool is often very limited. We do interviews and ask them what skills that they have".

What does seem clear in all of these scenarios is that the emphasis is on ensuring that employment opportunities are available to as wide a pool as possible rather than on recruiting individuals who already have experience. One contractor pointed out that the selection process focused on those with very few skills, "the poorest of the poor...generally people who have never worked before and have never had any kind of training". This emphasis on getting people into (short-term) jobs is understandable given the economic situation in an area such as Ficksburg, but it does impact on the consolidation of skills for individuals that these short-term infrastructural projects promise as the same individual is not likely to sustain sufficient employment to attain the kind of experience that would make them more skilled or employable.

In the case of Ficksburg, contractors described a situation where they bring in a semi-skilled team of permanent employees (generally about a third of the total labour force on the project), who work with, and provide on the job training to, unskilled local labour who are all temporary workers. The ratio of semi-skilled to un-skilled varies depending on the tasks being undertaken. Two of the three contractors interviewed indicated that they had taken one or two workers from the Setsoto contract onto their 'permanent' teams because they showed 'aptitude' and 'skill' during the course of their work, but these were an exception rather than the rule.

In the Gautrain project selection focused more on skills and the emphasis was placed on recruiting local labour that either had the skills or had the potential to be trained. 'Recruitment centres' were set up in places such as Alexandra, and potential employees were screened to identify those who already possessed the required skills, and those who were deemed to have the requisite potential to be trained. Selected candidates were sent to training centres for skills-specific and safety instruction. Training in safety was an important component of the Bombela Turnkey Contractor (TKC): as saying that an important objective of the project is to do everything safely. "We are in the process of setting very high objectives in terms of safety, and we put a lot of emphasis on training our employees in safety."⁴³

For jobs that may be considered semi-skilled, an extensive selection process was undertaken. Providers used Recognition of Prior Learning (RPL) and Learning Ability Assessments (LAA) to screen candidates. In order to qualify for machine operator training all candidates were required to write the South African Qualifications Authority (SAQA) recognised Learning Ability Battery Assessments. Only the top 15% were invited to be trained as operators in the fields of Front End Loader, Excavator, Bobcat, Articulated Dump Truck, Tractor Loader Backhoe and Mobile Crane.

3.4 BUILDING THE CAPACITY OF PROVIDERS THROUGH THE PROJECT

The wind farm project provides the most holistic example of the way in which the capacity of public and private providers can be developed as part of the process of implementing a flagship project. A draft skills planning model developed by

43 The CEO, Ian Thoms was quoted in Engineering News, <<http://www.railwaysafrica.com/blog/2007/07/05/gautrain-jobs-skills/#sthash.rplyZq1G.dpuf>>

Rhodes University (Lotz and Rosenberg), was developed to ensure skills development considerations are taken into account at different planning levels. Further, the Provincial Green Skills Forum emphasised that the skills requirements for wind farms was not primarily about totally new qualifications but about strengthening existing offerings with RE specialisations and 'top-up' skills as well as on-the-job training.

The emphasis therefore was placed on investment in good quality technical education and training, such as the development of artisans and technicians (including electricians and mechatronics in the case of wind farms), that provide support to the base occupations for the development of further specialised skills or 'top-up' skills. One of the respondents from a key contracting company at JBWF, Globeleq, indicated that a good baseline qualification in Mechatronics, complemented by an additional year of on-the-job training plus a structured, targeted training programme, including that by the turbine manufacturer would ideally be required for an effective engineer.

This approach can be seen in the focus of this project on building the existing skills system as part of the project and Rhodes University and the IDC are engaging the SETAs on approaches to green skills planning and funding. The success of these initiatives has yet to be evaluated. However, the study was able to gather preliminary feedback on the successes being achieved and the areas in which there are still challenges. Critically, it highlights the work that is being done with existing institutions of learning as discussed below:

The GSF highlights that the universities (NMMU and CPUT via SARETEC) are now offering RE programmes. A number of public TVET Colleges (i.e. East Cape Midlands; PE College; King Hintsa and Ingwe) and private (i.e. East London Industrial Development Zone (ELIDZ) and the Master Artisans Academy of South Africa (MAASA) have also been involved in the provision of training as part of this project.

The details of the programmes offered included Degree programmes (B.Tech., B.Eng., MSc and M.Tech., PhD and D.Tech.; an Advanced Diploma in Renewable Energy (ADRE), supported by E & W SETA; Short Learning Programmes (SLPs) in Renewable Energy and Energy Efficiency (in collaboration with CRSES – Centre of Renewable and Sustainable Energy Studies and Stellenbosch University); Post Graduate Diploma in Renewable Energy (offered by CIPSET - the Centre for Integrated Post-School Education and Training). The Centre for Energy Research is also undertaking significant studies in different aspects of renewable energy.

There are however some challenges with respect to the provision of the relevant skills at a higher education level. It was reported by the contractor in JBWF that the primary skills gap in the sector is in the operations stage of the project cycle, and particularly the technician level. Importantly, the tertiary training sector has been slow to recognise and respond to this need with targeted training programmes. Respondents pointed out that whilst SARETEC (see below) is a good initiative, it was unclear whether it has been pegged at the appropriate level, with the right programmes and with the available feeder skills. Others indicate that the real challenge is that, whilst significant work is being done to maximise job opportunities at all stages of the value chain for this sector, policy uncertainty is impacting on investment in RE support services and products. DEDEAT is currently undertaking a study on Bio-fuels and maximising opportunities in this regard and it is anticipated that, with greater levels of certainty, higher education may be able to improve their responses at this level.

A number of TVET colleges offer modules developed at NCV (L2): some of these processes are still at the pilot stage and, according to one TVET College respondent, a number of challenges have arisen in the course of implementation. These include that:

- Trained lecturers were unable to implement programmes as a result of a lack of equipment and a lack of a budget to expand the programme. The College is currently offering a Solar Water Heater Installer project.
- The college was unable to integrate renewable energy technologies into the Artisan Development Programme, particularly around Electrical and Mechanical.
- There were no identified issues in RE in the Business Skills programmes.

It is noted, though, that there are a number of initiatives that have been put in place to enhance the capacity of TVET colleges to offer these 'green programmes.' This includes an initiative that the GIZ is working on with the DHET and other partners to support these RE initiatives in this region through multiple interventions, including lecturer development.

In addition, in relation to the supply of skills for the RE sector as a whole, there has also been a process of establishing a specialised training centre: the South African Renewable Energy Training Centre (SARETEC). This centre was established in the Western Cape in 2012. As a national initiative established in response to the planned growth of the RE in the country, with the Eastern Cape representatives closely involved in a working relationship, it is funded by the Department of Higher Education and Training (DHET) and the Cape Peninsular University of Technology (CPUT), on whose Bellville campus the centre is based.

SARETEC's vision is to build up a skilled workforce for the renewable energy (RE) industry in Africa, with its mission being to provide leadership in the provision and accreditation of RE training and education in Africa, and assistance to industry in accessing RE services and expertise in the country. It will focus on Wind, Solar-PV, Solar thermal, Micro-hydro and Bio-gas, and aims to work in partnership with universities and TVET colleges as well as private providers.

SARETEC will provide Specialised Technician Training, RE Higher Qualifications, customised Short Courses as well as run workshops and conferences. It aims to train 480 technicians, 480 apprentices, 120 team managers and at least 750 participants in short courses by 2017. Working with the support of GIZ, it has already facilitated the training of 21 Wind Turbine Service Technicians in Germany in 2013 and 2014 as part of the broader initiative to address skills for RE.

In the Medupi example, the Tlhahlong Training Centre was built by ESKOM contractors. The facility was designed to respond to the needs of contractors and ensure that they were able to meet their training obligations. Built at a cost of about R24 million by Hitachi, it was on land owned by, and adjacent to, the Lephallale FET College. Murray and Roberts invested R26 million in the training centre with facilities that include classrooms, storerooms, workshops and simulation rooms. Gijima is the service provider responsible for managing the facility. Designed to accommodate 650 apprentices as part of the Murray & Roberts contractual obligations, the facility is used to train mechanical trades (welders, boilermakers, fitters and riggers) and mechanical occupations, (pipe fitters and steel erectors).

The facility uses the merSETA funded Accelerated Artisan Development Programme (AATP) programme to train artisans for Medupi. The curriculum is a fast-tracked pilot curriculum implemented over a 24 month programme (it would usually be delivered over a period of 36 months). The worksite provides an importance space for apprentices to complete the workplace experience and practical component of the training.

This 'private' facility, built on land provided by the College, was intended to be integrated into the Lephallale TVET College. However, there is widespread concern that the facility has operated completely separately from the College and that the necessary skills transfer has not taken place as anticipated. Respondents highlight concerns about the on-going 'excellence' of this facility should it become part of the college and indicate some concern that this facility will become less than efficient over time. This suggests that, for the College to develop the capacity to provide a similar standard of programmes, considerably more work will be required. This highlights a real concern about the extent to which the Medupi project is likely to leave behind a quality TVET college that can continue to provide relevant courses in an efficient and effective manner.

A related concern is that the candidates on the programme, as part of a merSETA initiative, have been funded and managed from a pilot project. The Medupi project initiated this pilot, but has not been entirely responsible for it and it is unclear how this funding will be replaced.

The above two factors (the extent to which the TVET college has the capacity to take over the running of the facility and whether there will be bursaries for students to undertake apprenticeships) raise a real question as to whether, when the project ends, continued quality provisioning will take place. This highlights the absence of a skills eco-system approach as these partnerships were not effectively developed from the outset of the project and therefore the expertise and

experience gained may be lost to the community. Having said that, given the level of change that the colleges have experienced since the project's inception, it may be that the skills eco-system approach may not have been realistic.

It is noted that there are also reports that additional training fabrication facilities were built in Nigel, Pretoria and Wadeville⁴⁴ as a direct result of the project. The continued viability of these facilities has, however, not been established, although it is likely that they are existing as Murray and Roberts training institutes to respond to their training needs for other projects.

The Gautrain project also provides an example of the way in which flagship projects can engage with institutions of learning. Given the complexity of this "transport endeavour...and the intricate combination of civil engineering and electrical and mechanical work that is being undertaken to create South Africa's first rapid-rail link",⁴⁵ it was initially expected that almost 2000 civil contractors would be in place at key times during the project and about 800 engineers would be required.

At the point of initiation of the Gautrain project, a South African Institute of Civil Engineers (SAICE) report suggested that there were 120 000 fewer trained engineers in SA in 2006 compared with 1990 and pointed to a real shortage of engineers. It was intended that the Gautrain project would assist in addressing this challenge by providing bursaries to five students in each of Civil, Electrical and Mechanical engineering programmes. Bursaries were provided in 2006, with a possibility that it was, 'to be followed up by many others during the 5-year period of construction'⁴⁶. Successful candidates were to be sent for practical training at Bouyges in Paris and Bombardier in London. This was expected to aid in the possibility of South African personnel running and maintaining the system.

It was considered necessary to develop skills in the area of 'technical equipment usage' as certain machinery used was '...fairly technical in nature and complicated to operate.' Bombela and its subcontractors ensured that the operators of the equipment were fully trained and capable of handling the machinery⁴⁷.

The track laying, electrical, mechanical, operation and maintenance were also to receive attention. A number of candidates (35) were identified in the electrical or mechanical field to be trained in the operation and management of the feeder bus fleet.

In the main – as indicated previously - Gautrain selected to utilise "on-site training rather than training at the training colleges". However they also used various specialized private service providers to provide training⁴⁸. These included:

- **Apex training facility:** Specialised civil construction training undertaken.
- **Kynoch training facility:** Plant and heavy machinery operators are mainly trained here. These include operators of excavators, front end loaders, mobile cranes, bulldozers and skid-steer equipment. Importance was placed on minimizing environmental impact.
- **The Goldfields Academy** provided 'leading employee learning solutions'. Tunnels and shaft workers were provided skills development and training in compliance with the Mining Health and Safety Act. This facility also included training in 'highly advanced' tunnel boring machines and for all new mining related equipment. NQF-aligned learning material was developed.

44 This included a Boiler Membrane Wall Workshop, two new CNC benders, a new welding training centre and a CNC header drilling machine facility, with significant local content ranging from 20-90%.

45 Cited at, <<http://www.railwaysafrica.com/blog/2007/07/05/gautrain-jobs-skills/#sthash.rplyZq1G.dpuf>>

46 <http://www.railwaysafrica.com/blog/2006/03/15/gautrain-to-offer-bursaries/#sthash.Qh89gTy5.dpuf>

47 <http://www.railwaysafrica.com/blog/2009/04/16/gautrain-skills-development/#sthash.mPwBbY18.dpuf>

48 <http://www.gautrain.co.za/about/sed-delivery/job-creation/gautrains-initiatives-enlarge-skills-database/#sthash.Jmw5upGx.dpuf>

It was estimated that, during the peak of Gautrain's construction, a labour force of approximately 7000 workers was employed⁴⁹. Work opportunities were created for unskilled and unemployed workers, who were trained in basic skills. By March 2008, it was claimed that more than 1600 workers completed training in various construction-related skills⁵⁰. However, despite all the efforts listed above; there was still a scarcity of sufficient and competent staff and operators in the civil and mining industry, which impacted adversely on the project⁵¹.

3.5 SME AND BBBEE DEVELOPMENT

A key aspect of many of these projects was the focus on SME development, which is seen as one of the key strategies with regards to addressing BBBEE. This placed a different skills imperative onto the projects and these were addressed in different ways.

In the Wind Farm example it was found that supporting and involving SMEs had been an area of challenge. Respondents stated that local suppliers were not able to meet the minimum requirements for procurement with respect to local supplier quotas. The respondents noted though, that the Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) have been engaged in capacity development to inform and develop suppliers to address this problem.

SME was an identified objective of the Gautrain project. It was specifically mentioned as an objective of the project in the speech by the Premier on 2nd July 2005, as a means by which to '...achieve the provinces goals with SME, tourism and BEE'. In addition, the Socio-Economic Development Report of May 2014 also refers to a significant SMME achievement of 230 SMME (R600 million). This was in addition to a relatively extensive BEE component where it was reported that there were 260 new BEEs (with a value of R1900 million) and 90 New BEEs (with a value of R800 million).

In the case of Medupi, contractors had obligations with respect to SME development and one contractor (as an example) stated that the proportion spent on 'local contracts' was 64.6%, which was higher than the initial obligation of 56.7%. For this contractor; procurement with BEE suppliers was significant at 67%, with those for BWO at 24% and SME's at 10%" (Respondent document).

One supplier in particular had an extensive SME component in their contract in setting up a sustainable self-funding SME, which stated that they were required to do the following:

- Set up a sustainable and self-funding, wholly Black Owned SME (the 'CSDP SME') that will provide competitive, locally developed, platform-independent software solutions for Plant Automation and Integrated Control;
- Provide support to the CSDP SME and access for the CSDP SME to the Alstom S&E Africa's global market presence for Plant Automation and Integrated Control Software; and
- Provide and carry out a skills development programme (which would include the development of engineering skills) for the personnel of the CSDP SME in the operation and maintenance of the business of the CSDP SME;
- Andrologix was established 1 March 2011. ALSTOM assisted in the formation and structure of this company as a wholly Black family-owned company (Husband 80% and Wife 20%).
- Skills transfer (Business Management, Technical expertise) is on-going and was instrumental in getting this platform-independent CSDP SME "on its feet". ALSTOM assisted in the formation of their Environmental, Health, Safety and Quality plans. These plans are at a level that has enabled them to qualify as a subcontractor on the Medupi site. Alstom had funded the initial start-up cost in the form of a loan.

49 <http://www.gautrain.co.za/about/sed-delivery/job-creation/gautrains-initiatives-enlarge-skills-database/#sthash.Jmw5upGx.dpuf>

50 <http://www.gautrain.co.za/about/sed-delivery/job-creation/gautrains-initiatives-enlarge-skills-database/#sthash.Jmw5upGx.dpuf>

51 This was compounded by the construction boom internationally and in South Africa at the time, as predicted by SAICE.

3.6 BALANCING THE DEVELOPMENT OF SA SKILLS WITH THE NEED TO IMPORT SKILLS

The debate about developing skills and the need to import certain specialised skills is an on-going one. In some cases this related to areas of high specialisation (such as aspects of Gautrain) in others this issue was more about the absence of sufficient skills or relevant experience. In terms of the latter, arguments were made that skills should be imported and this should be coupled with a skills transfer process.

In the Gautrain project it was noted that in some cases international recruitment would be necessary as a result of 'time constraints, with⁵² 'specific skills' needing to be brought in. It was nevertheless emphasised that, "Imported expertise would be used to train and develop local operatives.⁵³ " According to the Deputy-Director, Joost Marais:

"Bombela CJV [Civils Joint Venture] has integrated the best international skills and technology in designing and building the viaduct structure along the Gautrain alignment...The intention is for skills transfer to take place during this operation and to ensure that, through the training processes, the South African crew are able to gain the relevant skills and knowledge from our expatriate team.⁵⁴ "

By July 2007, 100 candidates from the Philippines, India and the SADC Region were employed on the Gautrain project in the areas of civil engineering, quality engineering and construction foremen. The spokesperson for the project commented that they were also looking at going into other markets, including New Zealand, Australia and Canada, and trying to attract South Africans with the relevant skills to return as part of the Homecoming Revolution.

The reasons provided for the importation of skills included the shortage created by the pressure to deliver against the 2010 World Cup timeline and the reality that there was a great deal of other construction taking place at the time to deliver on other imperatives for the World Cup. According to a spokesperson, "tight project timeframes and the scarcity of skills exacerbated by the boom in infrastructure development in preparation for the 2010 Soccer World Cup, made it necessary for the project to recruit from the international labour market.⁵⁵ " However, the importation of skills may also have related to the extent to which international partnerships were established to undertake this project, as is described below.

In the wind project, it was noted that there were certain skills gaps, creating the need to import skills. However, one respondent suggested that the South African dependence on foreign skills was possibly also the result of foreign procurement. One CEO reflected that, 'SA has most of the necessary skills in place for development, financing, construction and some manufacturing... there will, always be a level of foreign skills in place as 'foreign shareholders' will want this.' However, although the absolute reliance on foreign (high end) skills for leadership and expertise in these areas declines as 'local talent picks up the lessons'. It is therefore likely that absolute localisation in the face of foreign procurement practise is possibly unlikely, especially in emerging technologies. This is especially worrying since, according to one respondent, "...the renewables programme has developed a substantial advisory and transaction capacity which can, and will, be exported into Africa."

3.7 AND LOCATING INTERNATIONAL PARTNERSHIPS AS A DIMENSION OF THIS DEBATE

The Gautrain project had considerable international engagement from the outset of the project. Furthermore, there was an understanding that the project itself established South Africa as 'world class' and to succeed would require players from across the world. The then Gauteng Premier, Tokyo Sexwale, on a visit to Germany, was reported to have said to

52 The CEO of Bombela, Ian Thoms, cited in <<http://www.railwaysafrica.com/blog/2007/07/05/gautrain-jobs-skills/#sthash.rplyZq1G.dpuf>>

53 See more at: <http://www.railwaysafrica.com/blog/2008/03/14/gautrain-cranes-2/#sthash.Tzoinmdl.dpuf>

54 <http://www.railwaysafrica.com/blog/2008/03/14/gautrain-cranes-2/#sthash.Tzoinmdl.dpuf>

55 quoted in, <<http://www.railwaysafrica.com/blog/2007/07/04/gautrain-imports-skills/#sthash.TDGi8USK.dpuf>>

Siemens that he wanted to 'buy a train' (GMA, 2011:16). This was followed by a visit undertaken to Bavaria (Germany) as part of a twinning agreement between Gauteng and various cities who agreed to co-operate in different fields such as culture and education, where transport (was) also identified as an important issue of co-operation" (GMA:2011,16). In fact, the city agreed to undertake a pre-feasibility study into transport infrastructure in Gauteng. This was completed in September 1999, with *Dorsch Konsult*, the company tasked with this responsibility, pointing out that a 'rapid rail train was viable, but unfunded' (GMA, 17). The study suggested that a 'more comprehensive feasibility study was necessary and justified' (*ibid*).

The initial international input into the feasibility of the project was followed by considerable international engagement and involvement. From the outset, there was considerable interest in this 'globally competitive project in a developing country' (*ibid*, p.3). Thus Kagiso Financial Services, the entity responsible for financial feasibility, was assisted by Rothschild's and the expertise of the PUK (the PPP unit of the British Government) was sought in driving through this project. This was in addition to the various bilateral visits undertaken by a range of political and technical personnel involved in the project.

Both shortlisted bidders for the project were foreign consortia, with local partners. The Premier pointed out that,

"We are very satisfied with the two consortia that prequalified. They have three of the world's best and largest train and railway infrastructure companies involved, some of the largest and best international and South African construction companies and some of the best train operating companies in the world. Both these consortia met all the prequalification requirements and have the experience and ability to successfully design, finance, build, operate and maintain the Gautrain Rapid Rail Link"⁵⁶.

Each of the consortiums was required to secure the services of banks and funding organisations, empowerment companies, consulting engineers and other advisors. On 2 July 2005, the preferred bidder, Bombela Consortium, was announced at a special press conference.⁵⁷ Negotiations were finally concluded, after the official announcement of construction was made on 28 September 2006 (early work had already commenced early that year).

Similarly in the wind project, the importance of skills to renewable energy had been emphasised at the highest level, with mention made of establishing strategic international partnerships. In the latest State of the Nation address, President Zuma pointed out that, "For sustainability, government will establish strategic partner-ships for skills development with the countries that will partner us in the Energy Build Programme, while also generating skills locally" (Presidency, 2015).

Much has happened in this area already. GIZ has provided ongoing support to the RE initiative. Study tours and lecturer training programmes were undertaken in Germany; and secondment of technical support to DEDEAT and TVET colleges. The Minister of Energy, together with the Danish Minister for Climate, Energy and Building, launched the South African Wind Energy Awareness Campaign.

3.8 MONITORING AND EVALUATION OF SKILLS DEVELOPMENT

This report has already highlighted that many of those projects that were informed by national policy and that planned for skills from the project's inception, had a strong focus on monitoring and evaluating these skills. Much of the focus of the monitoring related to the actual 'training interventions' that have been implemented, the numbers of learners that have received training, and the assessments that they have undertaken (with their results).

56 Media release, March 30, 2003, downloaded from<<http://www.gautrain.co.za/newsroom/2003/03/two-consortia-successfully-prequalify/#sthash.4g23nheU.dpuf>>

57 SPEECH BY PREMIER MBHAZIMA SHILOWA, 02 JULY 2005, cited at, <<http://www.gautrain.co.za/newsroom/2005/07/speech-by-premier-shilowa/#sthash.gcit8XQE.dpuf>>

In the Medupi project, monthly reports of activities were compiled as well as reports that provided the overall picture at a specific point in time. For example, in the May 2008 report it stated that:

- 2165 training interventions were undertaken during May 2008
- 737 individuals received training during the month of May 2008
- 511 Individuals underwent Assessment or RPL
- 34 Learning Ability Battery Assessments were performed during May 2008

The report also indicated that:

- 1506 individuals have received training to date (January 2008 to 31st May 2008)
- 6119 training interventions/assessments have taken place to date (January 2008 to 31st May 2008)
- 272 individuals have written the *Learning Ability Battery Assessment to date* (January 2008 to 31st May 2008) (*ibid*)

These reports then indicated whether the training was on track or if there were challenges in reaching agreed upon targets. However, the focus of these reports is quantitative (numbers trained and cost of the interventions) and they did not reflect any qualitative success measures. This has meant that there are few reports about the relationship between numbers trained and the extent to which skills for the project were addressed (although, as can be seen by the above, this was a continual challenge). There was also little indication of the quality of this training and the extent to which individuals were able to complete qualifications, either during the project or subsequent to the project.

Reports indicate that, with regard to training claimed for verification, 5330 person-months of women participating in the 'Women Training and Mentorship Programmes' were claimed, with only 5060 person-months being verified and a total of more than 4610 person-months of 'Women Learners Employed and Mentored', compared to a verified number of little more than 4280 person-months.⁵⁸ Of note, the notion of person-months has not been clarified. Another mechanism of reporting is the nett costs of the intervention, with one report stating that, "more than R36 million was spent on Human Resources Development" (GMA, 2014: 26).

3.9 LEARNING FROM THE SIPS SKILLS PLANNING PROCESS

The Minister of Higher Education and Training was requested to address the skills dimension of the SIPS, and a Special Projects Unit was established within DHET to manage this. The skills work concerning SIPS began with the development of a planning framework or 'SIP Skills Plan'.

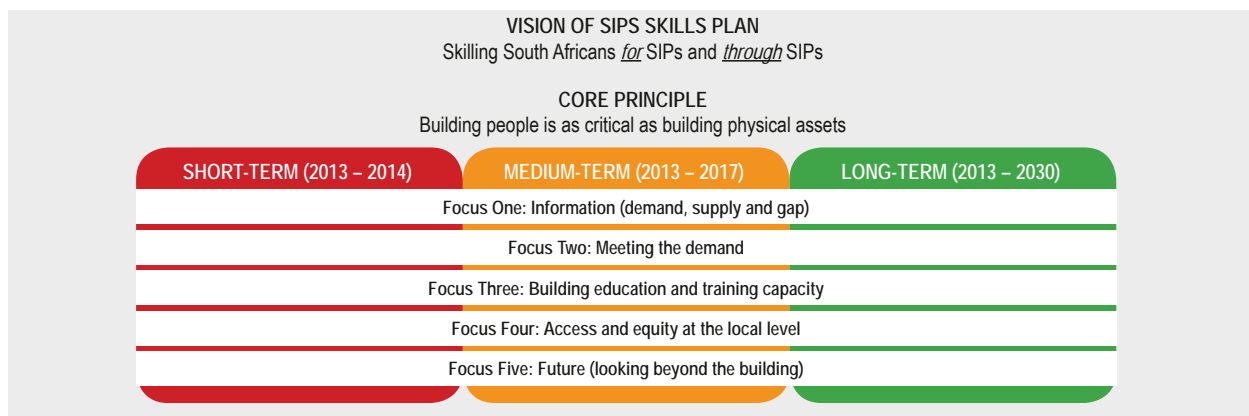


Figure 1: The SIP Skills Plan (Source: Skills for and Through SIPS, pp 37)

58 Cited in <<http://gma.gautrain.co.za/sed-achieve/gautrain-socio-economic-development-progress-2006-2012>>-

This report will not go into detail, but aims to highlight a few pertinent issues in relation to skills planning and SIPs. The SIPs planning process uses 'occupation' as the cornerstone, as it is the term used in the labour market. SIPs planning also places emphasis on the occupation for skills planning as it 'obviates the need for a one-to-one correspondence between the person trained and a project with a specific skills need'.⁵⁹ The idea is that a project/an employer needing someone within a specific occupation, can recruit from the pool already available. The priority is to increase the pool of those with the required skills.

Eight steps were followed to identify occupations in demand by SIPs, namely:

Step One: Determining sectors and sub-sectors

Step Two: Determining occupations for typical projects in sub-sectors

Step Three: Generating the project list

Step Four: Identification of skills prototypes

Step Five: Customisation of prototypes

Step Six: Estimating scarcity

Step Seven: From prototype to real project

Step Eight: Scarce skills from real projects

In the SIPs process, experts within a sub-sector, for example Generation (Wind) within the Energy Sector, are requested to develop a project prototype and build up a typical skills profile for each typical project. To date, 64 prototypes have been developed. According to the SIP 8 Coordinator, Wind Generation, a prototype has not yet been developed, due to insufficient information, primarily because of the confidentiality agreements between parties involved in wind farms.⁶⁰ The skills project prototype is typically then adjusted to the actual project by a scaling factor which would later be checked against actual skills information from projects that had commenced. The occupations that had been identified as being difficult to fill at prototype level were extracted to produce the scarce skills list. The list then focused on actions for skills development for SIPs as a whole.

The following improvements in the SIP skills planning model are envisaged:

- Inclusion of new sets of data into the modelling exercise, including the operations and maintenance phase;
- Expansion of the prototypes for those sub-sectors which have not yet been developed, and to use them to estimate the skill requirements for a greater percentage of planned, considered or proposed projects;
- Development of skill prototypes for the localisation thrust of the National Infrastructure Plan (NIP), which means establishment or expansion of local enterprises to deliver inputs into the SIPs; and
- More systematic inclusion of the skills requirements of government.

59 DHET (2014), Skills for and through SIPs

60 Source: Interview with Candice Brophy, IDC, Senior Project Manager, Strategic Integrated Projects, 10th April 2015

4. Discussion

The skills eco-system approach – as discussed previously - suggests that a number of elements should be in place to ensure the achievement of a number of imperatives associated with skills development. This section highlights the extent to which the projects included elements of the eco-system approach and the implications of this with respect to the successes achieved by the project from a skills development perspective.

4.1 UNDERSTANDING SUPPLY

The figure below provides a model (developed for the SIPs) for considering the kind of skills required for the particular large project:

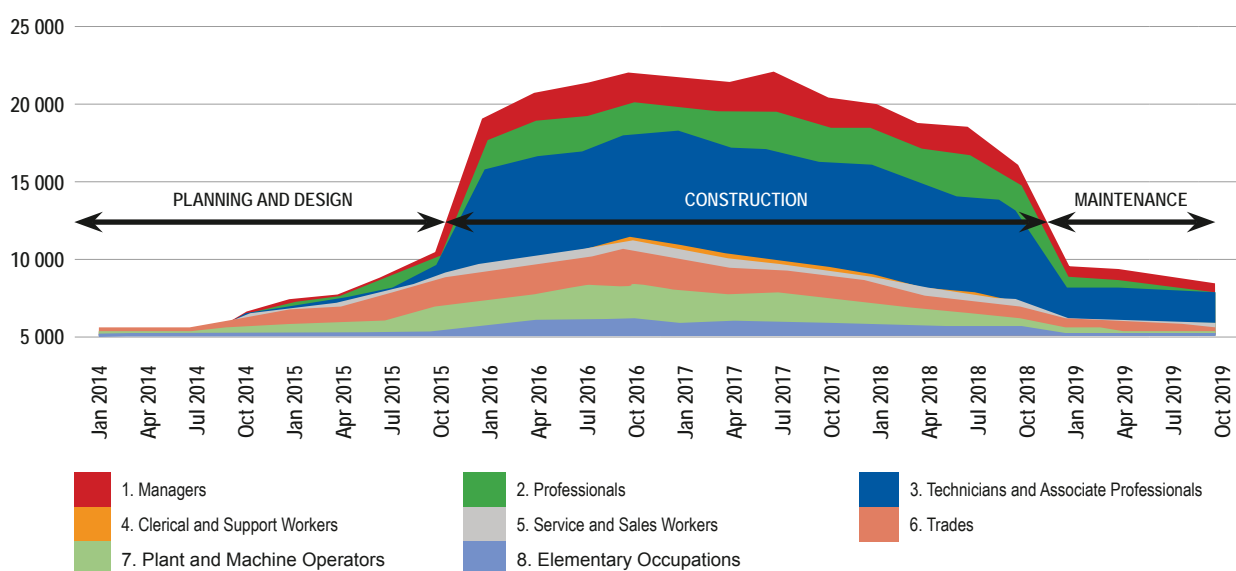


Figure 2: A Typical Skills Project Prototype

The prototype above is insightful in the way it encapsulates the skill needs in the course of the project. This allows project personnel to understand when they will require particular types of skills. It is evident that most mid-level skills are required during construction and then once the project has been completed, the actual operations require minimal maintenance.

The findings of this study suggest that there has been an uneven approach to planning for skills in these flagship projects although most of the projects (with the exception of the Ficksburg water project) considered how they would develop certain intermediate and higher level skills.

In the case of Medupi, in the planning phase there were clear targets agreed upon for the projects that focused on increasing the pool of artisans during the construction phase. There was also an analysis of which higher level skills would be required and how these would be sourced. Similarly with Gautrain, attention was paid to how higher level skills could be developed by assisting students to access existing programmes within higher education. In the case of the wind project, emphasis was also placed on ensuring that intermediate and higher level skills are supported. However, this project has extended beyond the existing qualifications and has explored how these may be adapted to meet the needs of the Renewable Energy sector more broadly.

The work done in the RE sector is an example of how skills planning can be undertaken in partnership with multiple stakeholders. This work has been complemented by the activities being undertaken within the SIPs, where the focus has been on defining the occupational requirements of the projects with respect to skills, including intermediate and higher level occupations, and to translate this into the skill requirements. This process has highlighted the need for generic intermediate and higher-level qualifications that include certain specialisations as required. There is also the recognition that individuals may also require further top up training relevant to the project. This approach essentially focuses on the development of a pool of graduates that can be drawn into various key occupations as identified by the SIPs 'Scarce Skills list' as projects unfold.

In undertaking an analysis of demand, and the existing supply, the wind project has been able to determine how providers can then be effectively drawn into the 'skills eco-system' in order to enhance supply to meet this anticipated demand. One of the reasons SARETEC was established as a dedicated centre, was to ensure that the skills required by the RE sector are developed by educational institutions in South Africa. This requires partnerships across higher education institutions, TVETCs, and SETAs, with industry institutes and bodies such as the South African National Energy Institute (SANEDI), professional bodies and private training bodies.

4.2 DEMAND

The real challenge of many of these projects is that they are in areas where there are limited opportunities for employment. Further, the projects typically paid little attention to the skills that the majority of workers would acquire during the life of the project because the project had limited needs for skills at this lower level. Furthermore, it was unclear what would happen to these workers once the project was completed. Thus, for local labour that access short term contracts and receive limited skills training, there are few opportunities for further employment and so little chance for these workers to build and deepen these skills.

One option is to reduce the emphasis on local labour (where it is defined as coming from the community in which the work is taking place) as this would create the chance for a smaller group of workers to access work for a longer period. This issue has long been debated. The value of a skills eco-system approach is that it shifts the debate away from this to a discussion about the kinds of opportunities that could be stimulated in the local area and in turn the kinds of skills that would be required by local workers to support these opportunities. The Medupi Legacy Initiative (MLI) – albeit late in the day – is beginning to adopt this approach and it will be critical to understand the extent to which they achieve this objective. Its possibility as a model for implementing large infrastructure projects in a community in a way that leaves a sustainable footprint could be usefully documented and lessons learnt.

Another option that was posited for ensuring that the opportunities are not short-term, was provided by a respondent who referred to the example of large development projects in China (Shanghai), where a twenty year plan to build three power stations was based on planning that requires skills to be developed and utilized over the twenty year period. The respondent suggested that the result of this model will provide the basis of sustainable localisation of capacity, which would enable the local companies to work with foreign companies at various levels and develop the expertise of the local companies to tender for projects in other countries thus further growing the industry. It is not clear as to whether this possibility – of staggering construction dates - was considered with respect to the construction of Medupi and Kusile. However the urgency of power supply may have militated against this possibility and it is also recognised that given debates about local employment (as discussed above), it may not have been possible for low-skilled workers to move from the one area to the other, although it would have created greater opportunities for intermediate level skills development.

In reality, in the South African context, many of these projects are 'one-offs', making the suggestion to stagger similar projects, which are located in close proximity to each other, difficult to achieve. However, in other projects, such a scenario may be possible. As the case study on bulk water supply indicated, there is potentially a role for the

Department of Co-operative Government and Traditional Affairs (CoGTA) to play in supporting more coordinated planning through the MIG allocation and planning process. Planning within a skills development/ skill eco-system frame proposes that it might be possible to roll out projects in a manner which supports the gradual acquisition and utilisation of meaningful skills over time within a particular geographic area. So, for example, if the MIG for the Ficksburg infrastructure development was followed by grants for similar infrastructure development in other towns in Setsoto (Ladybrand, Clocolan and Senekal), a group of workers in the greater Ficksburg area could develop a much deeper skills set over time.

However given the issues relating to the mobility of unskilled workers and the challenges associated with limited funding for such projects, this option may not be viable and suggests that there is a need for local role-players to be proactively involved in this process in order to enable sustained solutions to this challenge. This suggestion recognises that, in a skills eco-system approach, there is a need to 'identify a problem, opportunity or challenge' and then unpack this with stakeholders. Critically, this requires that industry stakeholders accept responsibility, "...not simply for identifying and publicising perceived skill gaps but for actively managing the development of workforce capacity to minimise the risk of [skills] gaps arising."

The challenges raised above emphasise the value of the skills eco-system approach as it highlights the need to consider how demand can be generated whilst the project is being implemented. It also highlights the need for the providers to be developed during the life cycle of the project so that they can, in turn, support individuals to enter these different routes.

4.3 COORDINATION AND STAKEHOLDER INVOLVEMENT

It has been found that, for skills development to be sustainable, there is a need for co-ordinated forward planning. The research has emphasised that, "skill ecosystems are not discrete entities (and that) they overlap with other ecosystems and interact with, and are shaped by, wider systems and policies." This emphasises the need for the planning that takes place at a project level to reference national, and where relevant provincial, processes. This includes taking cognisance of national occupational and qualification frameworks and systems. It also requires that mechanisms be utilised to support on-going activities for individuals that acquire some experience in the project to enter (such as small business support).

There is also a need to ensure linkages with SETAs and with TVET Colleges from the outset. The role of private providers also needs to be evaluated to develop a clear conception of the role they could play in ensuring supply meets demand. This will require a clear conception of the innovative partnerships that could be defined with private providers that could build the capacity of public TVET colleges. However in making these observations it is important to note the learning from the Medupi example where there are real challenges in enabling this capacity transfer, as well as the challenges experienced by the wind project in terms of work with the TVET colleges. These challenges need to be taken into account at a national level to ensure that national government creates an environment in which these challenges can be addressed. Clearly TVET colleges themselves need to recognise the importance of proactive involvement in these initiatives.

Thus good skills planning around a project creates opportunities for building partnerships for ongoing appropriate innovative training approaches which, although initially are directly linked with the project, could be utilised for the ongoing needs of local economic development in the community.

Further, effective skills ecosystem project implementation requires appropriate and relevant engagement with a range of stakeholders. The key imperative is to ensure that all stakeholders have a 'shared interest' in the outcomes and that the role of skills development in these projects is understood. This requires an approach that ensures that the immediate needs of the project are not compromised. A longer term perspective is necessary so that skills required can

be developed over time, both linked to the projects as well as to other demands generated during the life of the project. Although it is noted that, with the service delivery backlog and high unemployment rates in South Africa, there will always be an emphasis on speeding up development and creating even temporary low skilled jobs, the notion of trying to build a skills ecosystem around these types of projects, has merit if we are to look at the longer term social impact of the project. This would require a co-ordinated project management approach with a powerful and credible project manager. It also requires the presence of a strong process driver, who can bring together the various and divergent interests in building an effective skills eco-system.

5. Recommendations

5.1 INTEGRATING SKILLS DEVELOPMENT INTO THE DESIGN OF THE PROJECT

The study points to the value of considering skills planning in the design of the mega-project and suggests that this should take into account a number of dimensions:

- It requires an analysis of the existing experience and skills in the area and a plan that considers how individuals with experience and some skills can be involved in the project such that they are able to increase their experience and deepen their skills.
- It should consider which skills will need to be brought in from other areas (within South Africa) and the impact of the skills supply considerations given the competing projects that exist.
- It should also consider the nature of the demand in the project and the potential opportunities that can be generated during the life cycle of the project, taking into account the catalyst role that the project could play. This recommendation takes particular cognisance of the learning from the Medupi example, which highlights what is possible with this approach, but also points to the need to undertake this planning at the start of the project rather than at its conclusion. It should also consider the possibility, through utilizing a skills eco-system approach, of considering ways to coordinate the utilization of individuals with particular skills so that they can get sustained work –to ensure that their skills remain current and are continually improving. Learning from projects in South Africa, point to the possibilities related to this approach.
- The above should inform the targets set for projects and for the training of the unemployed as well as individuals who are already in the industry. It ensures that the targets set take into account the resources in the community, the requirements of the project and, critically, the opportunities that could be generated through the project.
- It suggests the need to build the imperative for skills development in the procurement process so that contractors take this into account in the project plan. It is noted that this approach is already supported by an initiative that the Construction Industry Development Board (CIDB) is taking forward. The CIDB is intending to gazette and publish a 'Best Practise Standard for developing Skills through Infrastructure Contracts'. This initiative flows from an earlier discussion document (CIDB, 2007), which recommended the establishment of best practise intended for, "procurement strategies that enhance skills development" (CIDB, 2007:12). The draft regulations still to be gazetted include a range of 'minimum contract skills development goals' intended for occupational and trade qualifications, a national diploma and registration in a professional category. It is designed to be applied to projects with a duration of 12 months or more, with a contract value equal to and exceeding R2 million (for professional services or service contracts) or R40 million in the case of engineering and construction works. The Gazette intends to establish, "...methods by which the (skills) performance indicator is measured, quantified and verified in the performance of the contract" (proposed Gazette dated 08.08.2013).

5.2 TAKING A BROAD APPROACH TO 'SKILLS'

It is recommended that the focus of skills development should be on the development of generic qualifications. This may include certain curricula changes that could be built into specialisations created to address the specific imperatives of the project. This approach is well demonstrated by the wind project whereby role players identified the specific skills required related to RE and the nature of the intermediate and higher level qualifications that could be adapted to include these elements such as wind turbine service technicians. It is suggested that additional on-the-job training should then also be supported where relevant. This should also be included in the compact for the project as these skills are critical both for the success of the project and that they are also useful where individuals may be entering another occupational area after the project. As such the training they receive should be 'as required' and the possibilities for further skills development in the occupation that they will be entering should then be organised as a way of transitioning the individual after the project. As indicated in this report this approach is consistent with that posited by DHET within

the context of the SIPs, which focuses on the development of an adequate pool of qualified graduates that can be drawn into various key occupations as identified in the SIPs 'Scarce Skills list' as they unfold. The observation by one government official is particularly pertinent; the respondent observed that, 'the best advice is train good generalists' (Interview with A Bird, DHET Special Projects Unit).

Further, many key informants stressed that a broader, holistic approach to skills development needs to be taken and emphasised the need to support the development of foundational skills in mathematics and science.

5.3 BUILDING 'SUPPLY' CAPACITY

This study has highlighted the potential value of establishing partnerships with TVET institutions, universities and workplaces to support the different components of learning, including theory, practical and workplace experience. It is noted that some of these projects have made real efforts to establish an understanding of who the providers are, and have developed an approach to working with these providers to augment their capacity. This was reflected in their ability to develop and offer curricula that accommodate innovations that have been introduced. However, they noted the complexities of such an approach, which are also highlighted in the Medupi example and, as suggested previously, it is strongly recommended that the relevant public entity, in this case the DHET, focus specifically on enabling those public institutions that have been identified to participate in these processes.

5.4 BUILDING THE CAPACITY OF LOCAL ROLE PLAYERS TO ENGAGE IN THESE SKILLS PLANNING PROCESSES

The study points to the importance of the involvement of provincial and local government in processes that enhance skills development. It points to the role that they need to play in bringing in other role players and coordinating initiatives that support local economic development, in order to take advantage of the project to build a skills eco-system in order to widen local economic development to ensure that there are continuing opportunities for individuals to access as they leave the project.

The possibilities that such projects could play a catalyst role for further job creation are highlighted in the example of wind projects. The criteria within the REIPPPP, for instance, which focus on the community i.e. local job creation, local ownership and enterprise and socio-economic development, has led to the recognition that there is a need for a broader capacity building programme for SMMEs. There are clearly possibilities to increase the likelihood that SMMEs may meaningfully participate in the REIPPPP - and ultimately other related projects - through the provision of goods and services. However, ensuring that these plans are in fact developed in an innovative manner, and that they are implemented expeditiously, and that the skills planning initiatives support these initiatives, requires consideration of enhancing capacity which needs to be developed if these recommendations are to be realised in any meaningful way.

5.5 IMPROVING MONITORING AND EVALUATION

There is a need to ensure that there are mechanisms to track progress against targets and to put plans in place where targets are not being met. As important, is a need for an evaluative mechanism to be put in place which establishes the extent to which the project was able to attract and develop individuals with the requisite skills. Clearly this needs to be done in a manner that ensures that skills are not an impediment to the completion of the project - in terms of it being completed to the requisite standard, within budget and on time. It should also consider the extent to which the skills planning is completed in a manner that considers the skills eco-system. Importantly, there is a need for it to create a basis for individuals to access further opportunities and for some individuals to grow their experience and

skills such that they can attain a qualification in construction, while others can be trained to enter other opportunities generated through the project. Further, the extent to which the project leaves a legacy in the form of public providers with additional capacity, should also be established. This learning should be shared so as to encourage best practice and a reference for future large scale infrastructure projects. It should also be coupled with the sharing of resources.

5.6 ENHANCING COMMUNICATION AND INFORMATION DISSEMINATION

The need for effective communication and information dissemination is cross-cutting. Providing the right information to the right people at the right time can lead to a proactive and more effective approach. Provincial government and municipalities in particular stress the need for information to be provided to them early in the planning stage of national projects so that they can gear up to maximise the local opportunities and particularly with respect to enterprise development.

In addition it is suggested that there is a need to enhance the process relating to the skills register so that it is easier to undertake effective skills planning, taking into account the available skills at local, as well as national levels.

It is also emphasised that other players, such as industry bodies, can play a key role in sharing information and, in particular, information on learning and career opportunities that needs to be developed and made available to various target groups within the context of the national strategy on career development, driven by DHET. Young people at school, for example, who are making decisions about their career choices, need to know about the new career opportunities that RE (including wind energy) present.

6. Conclusion

This document has highlighted the extent to which skills training is an important component of flagship projects. This training has supported SMMEs as well as the ability of the project to be implemented as required (by focusing on ensuring that the necessary skills are developed and put in place).

This report has highlighted the need for skills development to be integrated into the project design so as to allow space for certain skills, that require a longer duration, to be developed – such as artisans and engineers. The findings have also shown that there is a need to consider which other projects are to be implemented nationally so that demand in the project can be considered within this wider context and plans made accordingly.

The report also found that insufficient attention is being paid to developing a plan that outlined what the majority of workers (primarily those with lower levels of skills) could do after the project. Nor has there typically been sufficient attention paid to the development of public providers as part of these projects, such that capacity for provision could be enhanced at a local level (although a few of the projects have done this). These gaps have caused many challenges in communities and raise questions about sustainability. They also emphasise the possible value of adopting a skills eco-system approach, which would emphasise local skills development and longer term plans with respect to utilising the skills and developing provider capacity.

It is noted that, whilst attention has been focused on BBBEE and SMME development, there has been little attention paid to gender issues beyond the mandatory targets defined. Unfortunately, while many of these projects go beyond setting and meeting targets for women, few address gender issues beyond this. This is an area that requires further attention in the future.

7. References

- Akoojee, S. (2010). Skills development and transformation: Unravelling workplace skills transfer in trying economic times! In J. Hofmeyr (Ed.), *Vision or Vacuum? Governing the South African Economy* (pp. 88-95). Institute of Justice and Reconciliation.
- Altgen Consulting (2014). *Renewable Energy and Energy Efficiency Career Pathways*.
- CIDB (2007) Skills for Infrastructure delivery in South Africa: The challenge of restoring the skills pipeline.-A discussion document. CIDB, Pretoria.
- City Press website – various articles on the death of Andries Tatane and events in Setsoto post his death www.citypress.co.za
- Cullinane, S (2003) Hong Kong's low car dependence: Lessons and prospects. *Transport Geography*, 11(1), 25-35.
- DBE. (2010). *Education Statistics in South Africa: 2009*. Pretoria: Department of Basic Education.
- DEDEAT (2014). *Resource Pack for SMMEs in terms of Renewable Energy Independent Power Procurement Programme – Kouga Municipality*, Nov 2014, DEDEAT
- Department of Trade and Industry (2011). *The National Growth Path: The Green Accord*.
- DHET (2014). *Skills for and Through SIPs, DED, Pretoria*.
- DHET. (2013a). *Statistics on Post School Education and Training in South Africa:2010*. Pretoria: Department of Higher Education and Training (DHET).
- DHET. (2013b). *Statistics on Post School Education and Training in South Africa: 2011*. Pretoria: DHET.
- DHET. (2014). *Statistics on Post-School Education and Training in South Africa: 2012*. Pretoria: DHET.
- DME. (2003). *White paper on renewable energy: November 2003*. Pretoria: Department of Minerals and Energy.
- DoE . (2004). *Education Statistics at a Glance in 2002*. Pretoria: Department of Education .
- Donaldson, R (2006) Mass rapid rail development in South Africa's metropolitan core: towards a new urban form? *Land use Policy*, 23, 344-352.
- Donaldson, R., and van der Westhuizen, J. (2011) Built in a Field of Dreams? Spatial Engineering and Political Symbolism of South Africa's Rapid Rail Link Development: Gautrain. In Stanley D. Brunn (ed.) *Engineering earth: The Impacts of mega-engineering projects*, Springer, Dordrecht, pp. 683-695.
- Eberhard, A et al (2014). *South Africa's Renewable Energy IPP Procurement program: Success Factors and Lessons: May 2014*, World Bank.
- Fine, B. (2008). *The Minerals-Energy Complex is Dead: Long Live the MEC?* . Cape Town: paper delivered at the Cape Town Conference, 2011*.
- Finegold, D (1999) Creating self-sustaining, high-skill ecosystems, *Oxford Review of Economic Policy*; 15 (1): 60-81.
- Fox, H (2000) World Bank urban transport strategy review-Mass rapid transit in developing countries, From, http://www.worldbank.org/transport/utstr/background-papers/uk_mass_transit_halcrow.pdf
- Gautrain Management Agency (GMA). (2014). *Socio-Economic Development Progress*. Johannesburg: GMA.
- Gautrain Management Agency, G. (2011). *Gautrain: For people on the move. . Kelvin, Johannesburg: GMA (No. 0335 of 1000 printed)*.

IDC (2014), *Integrated report for the year ended 31 March 2014*.

Jo'burg (2006) Public urged to vote for a Gautrain logo, cited at, <www.joburg.org.za>

Lephalale Municipality. (2014). Integrated Development Plan, 2014-2016. Retrieved 01 20, 2015, from [lephalale.gov.za: http://www.lephalale.gov.za/docs/SDBIP/Final%20%20IDP%202014%20-%202016.pdf](http://www.lephalale.gov.za/docs/SDBIP/Final%20%20IDP%202014%20-%202016.pdf)

Lephalale Municipality. (2014). Integrated Development Plan: 2014-2016. Lephalale: Lephalale Municipality.

Lorentzen, J., & Gastrow, M. (2012). Multinational strategies, local human capital, and global innovation networks in the automotive industry: case studies from Germany and South Africa. *Innovation and Development*, 225-244.

Maia, J; Giordna, T; Kelder, N; Bardien, G; Bodibe, M; Du Plooy, P; Jafta X; Jarvis, D; Kruher-Cloete, E; Kuhn, G; Lepelle, R; Makaulule, L; Mosoma, K; Neoh, S; Netshitomboni, N; Ngozo, T; Swanepoel, J (2011): *Green Jobs: An estimate of the direct employment potential of a greening South African economy. Industrial Development Corporation, Development Bank of Southern Africa, Trade and Industrial Policy Strategies*.

McGrath, S., & Akoojee, S. (2007). Education and skills for development in South Africa: Reflections on the Accelerated and Shared Growth Initiative for South Africa. *International Journal of Educational Development (IJED)*, 27(4), 421-434.

Policy Framework for the Introduction of the Municipal Infrastructure Grant (MIG). (2004) Department of Co-operative Government and Traditional Affairs. Accessed from <http://www.cogta.gov.za/mig/docs/2.pdf>

Province of the Eastern Cape (2012), *The Eastern Cape Strategy for Renewable Energy*.

Province of the Eastern Cape, Economic Development, Environmental Affairs and Tourism (2014), *Resource Pack for Small, Medium and Micro Enterprises in terms of the Renewable Energy Independent Power Producer Procurement Programme*, November 2014.

Radebe, J (2006) Address at the launch of the construction of Gautrain Rapid Rail Link, MP Minister of Transport, Marlboro, 26th Sept. 2006.

Renewable Energy Training at the NMMU, powerpoint presented to the GSF, 2014

S. Tang, H.K. Lo (2008) The impact of public transport policy on the viability and sustainability of mass railway transit – The Hong Kong experience. *Transportation Research Part A* 42 (2008) 563–576

Schamp, E., & Stamm, A. (2012). New trends in an old sector: exploring global knowledge and HR management in MNCs and the North - South divide in human capital formation. *Innovation and Development*, 285-302.

Setsoto Profile on Wazimap. Accessed from <http://wazimap.co.za/profiles/municipality-FS191/>

Setsoto Water Website – background information <http://www.setsotowater.co.za/infofb.html>

Setsoto (2015) website – various background documents, including IDP and Annual Reports <http://www.setsoto.info/downloads.php>

Shilowa, M (2006) Speech by Gauteng Premier Mbhazima Shilowa at the launch of the Gautrain project, 28th Sept. 2006.

Steinberg, G M (1987) Large-scale national projects as political symbols: The case of Israel. *Comparative Politics*, 19(3), 331-346.

The Presidency. (2007). JIPSA Report. Pretoria: The Presidency.

van der Westhuizen, Janis (2007) Glitz, glamour and the Gautrain” mega-projects as political symbols. *Politikon*, 333-352.

Water Supply and Sanitation in South Africa Environmental Rights and Municipal Accountability (2009) LHR Publication Series (1/2009) Lawyers for Human Rights. Accessed from http://www.cer.org.za/wp-content/uploads/2011/11/LHR-DBSA_Water_Report.pdf

Windsor, Kim (2006). Skill Ecosystem National Project Mid Term Evaluation. New South Wales Department of Education and Training. Accessed from https://www.training.nsw.gov.au/forms_documents/industry_programs/workforce_development/skill_ecosystem/kim_windsor_interim_evaluation.pdf

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