LESEDI NUCLEAR SERVICES
Engineering Procurement and Construction (EPC)

LESEDI

IEP and IRP public hearing presentation
A SOUTH AFRICAN PERSEPCTIVE

SHANE PEREIRA | 13 December 2016
Business Development Manager – LESEDI
Advisor board member – African utility Week (AUW)
Communication Sub Committee Chair – NIASA

Overview



Lesedi Nuclear Services is a leading Engineering, Procurement and Construction (EPC) company in the Power Generation industry in South Africa.

Lesedi is technology agnostic and currently >75% of our revenue is from industrial activities

Industrial projects overview

An Engineering, Procurement and Construction *(EPC)* company that has been involved in some of the largest power generation projects in South Africa

Conventional Power Generation (Major Projects)

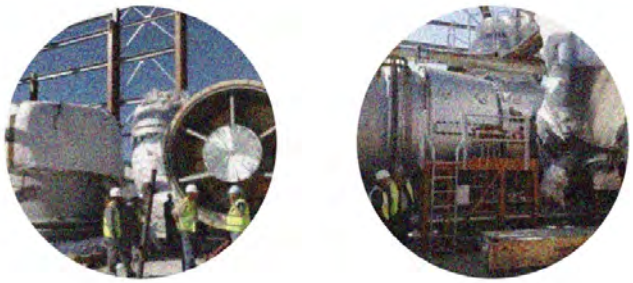
1		**Open Cycle Gas Turbine Projects**	*14 turbines, 2 sites* 2006 – 2009 **Value > R450 Million**
2		**Medupi Coal Fired Power Station**	*4800MW Power Station* 2009 – 2019 **Value > R1.5 Billion**
3		**Kusile Coal Power Station**	*4800MW Power Station* 2011 – 2016 **Value > R100 Million**

Open Cycle Gas Turbine Projects

Construction of 14 Open Cycle Gas Turbines *(OCGT's)*, each with an output of 150 Mwe

Assembly of Turbine Generator Sets
Client: Siemens

- Installation of power generating components including turbines, combustion chambers, generators and clutches, using laser alignment equipment
- Installation of all associated mechanical equipment, auxiliary and utility skids

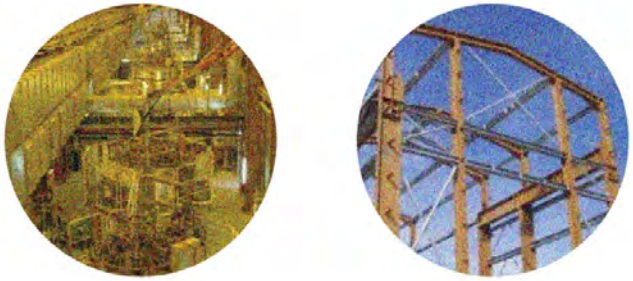


Steam Generator Sets

Building of Turbine Enclosures
Client: Siemens/ Roschon

- Turbine hall erection

  (over 1,800 tonnes of structural steel work, over 8,400m2 of sound proofing and environmental protection cladding)



Steam Turbine Enclosures

Open Cycle Gas Turbine Projects (contd.)

Design, Construct & Commission Balance of Plant (BOP)

Client: Eskom

- Detailed design, procurement, construction and commissioning of the BOP for power stations including: Fuel unloading, treatment and forwarding systems, fire protection and detection systems, de-mineralized and potable water distribution systems, compressed air system, electrical power distribution, control and instrumentation systems

Steam Turbine Enclosures

Piping Fabrication and Installation

Client: Eskom/ Siemens

- Workshop prefabrication and field installation of over 14,000m of piping *(50NB t0 300NB carbon and stainless steel)*

Tanks

Design and Construction of Tanks

- Various capacities dependent on project requirements (up to 60,000 cubic meters)
- Codes: API 650
- Auxiliaries: access ladders, roof platforms, fixed cone roofs etc.


Medupi Coal Fired Power Station

Capacity

- Six super critical units (800MW per unit)
- Nominal generating capacity of 4,800 MW

Coal Supply

- Coal is sourced from the local coalfields and delivered to the power station via conveyor belts
- The Exxaro Mine, formerly known as the Grootegeluk Mine, also has the capacity to supply coal to the Medupi Power Station
- 7 million tonnes of coal per year are required

Medupi Project Overview

Epc contract for the balance of plant (bop) at the Medupi coal power station for Eskom (Lesedi is the lead within the LPS Consortium).

Scope of work (design of 17 systems)

- Auxiliary plant cooling systems
- Potable water distribution system
- Fire water supply and distribution system
- Demineralized water distribution system
- Raw water supply system
- Clean and dirty drains recovery system
- Fly ash conditioning water system
- Bottom ash cooling and Mill reject water system
- Coarse ash conveyor belt washing system
- Ash dump dam make-up system
- Ash dump irrigation and dust suppression system
- Coal stockyard water recovery system
- Compressed air supply and distribution system
- Diesel fuel oil supply, storage and distribution system
- Turbine lubrication oil storage and regeneration system
- Daily issue oil store
- Dirty and used oil collecting and storage

Procurement

All BOP associated components and equipment: Compressors, heat exchangers, pumps, valves, tanks, fuel filtration systems, instruments etc.

Workforce

The Lesedi workforce (including Subcontractors) for the Medupi project consist of approximately 1200 engineers, technicians, artisans, supervisors, safety officers, first aiders, labourers etc.

Contractual

All aspects of the Medupi project is managed by applying the FIDIC Conditions of Contract for Plant and Design- Build.

Procurement & subcontracting

> R 1billion

Local content

Currently > 86%

Nuclear Projects
> 150 modifications performed at Koeberg Nuclear Power Station

Localised Lesedi Services Division - Nuclear

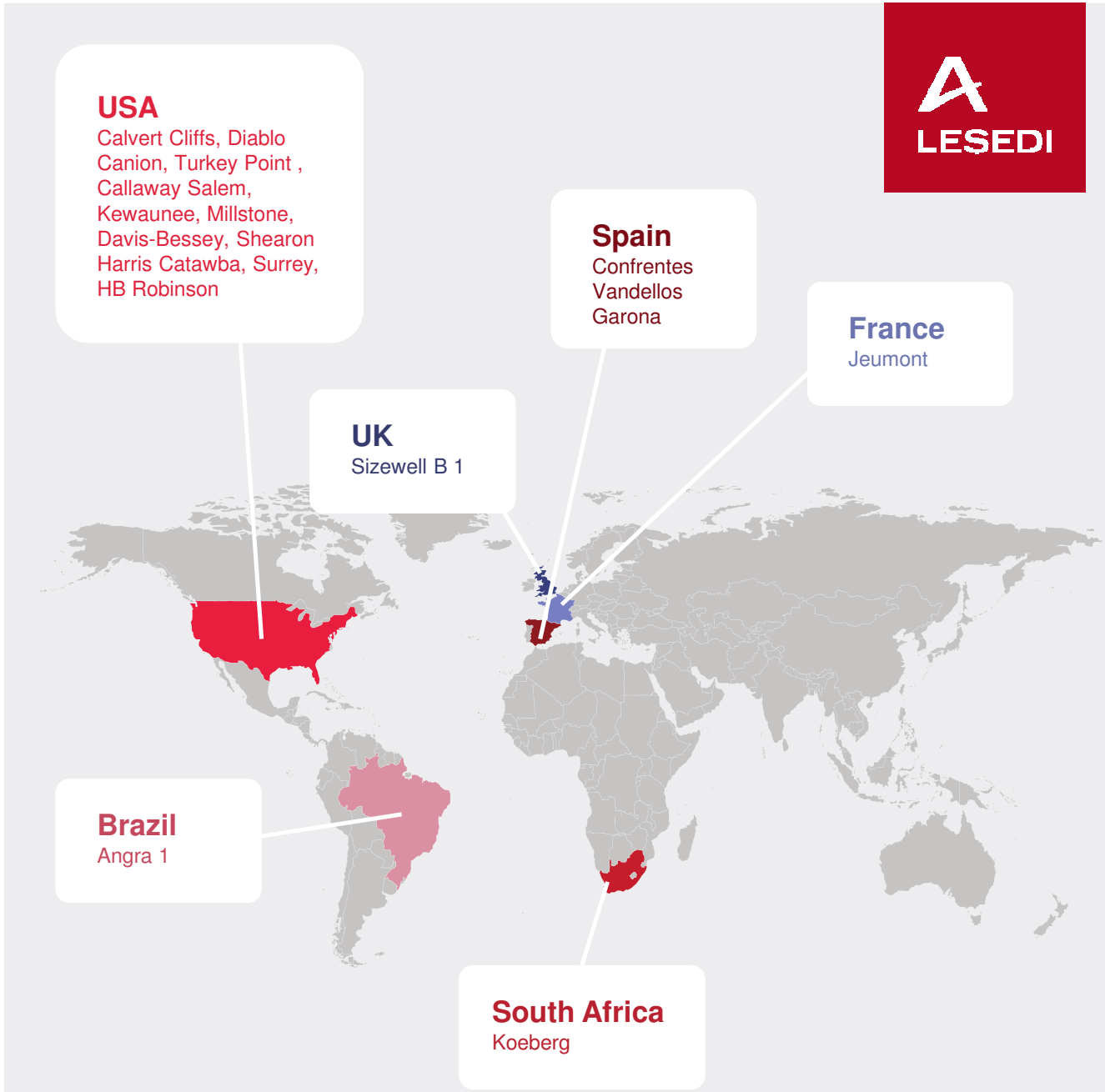
	Valves and Pumps Maintenance	Refueling Package	Steam Generator Packages	Reactor Coolant Pump Package
Localised since	**1999, contract with OEM**	**1999**	**Since 1989**	**2001**
Scope	Nuclear Valves, Conventional Valves, Pumps (non nuclear), Pumps (Nuclear Island and Balance of NI)	Fuel handling, Preventive Maintenance Checks, RIC Maintenance, Vessel head Work TVI - Inspection	• Opening and closing of primary and secondary man ways (1998); • Water lancing (1992); • Tube Plugging (2000); • Eddy Current (2001) • Tube Plugging Operating (2015)	• Routine maintenance and inspections • Overhaul of the Reactor Coolant Pump & Motor • Pump and motor swap-outs; Commissioning and Testing
Training, Training Academy	Supervisors generally need 4 outages before being authorized to become a supervisor	2 weeks: Basic Rigging and Pendant Crane Training Fuel Handling training	All Personnel undertaking work on the SG's need to re qualify before every outage and these people need to be authorized	• Qualified artisans with basic rigging training
Personnel (as @ Jan 2016)	2 Team Leaders 6 authorized Supervisors 43 qualified Mechanical artisans 49 Semi Skilled - from the local community – Atlantis	12 Fuel handlers 7 Head Work Team – Semi Skilled and Mechanical Artisans 1 TVI Inspection	6 Packager Manager 6 Water Lancing Technicians 6 Eddy Currently Line Supervisors 6 Eddy Current SG Assistants Total Crew – 57 Technicians	2 Team Leaders 4 Mechanical Artisans

International Nuclear Services

Provision of Personnel Globally thanks to AREVA worldwide presence – Various Packages

Enables Lesedi to:

- Retain and maintain certified and authorized nuclear skills for Koeberg
- Recruit and train additional resources
- Core team of 25 people
- Upfront financial commitments for training are substantial



Current: Steam Generator Replacement

Replacement of 6 Steam Generators
Lesedi in a JV with Group Five

Scope:

Engineering and design with regard to the JV responsibilities

All site related works for the removal and replacement of the steam generators

- SG supports & primary pipe supports removal and replacement
- Clamping (temp support) installation & removal for primary pipes
- Concrete Core Drilling of all holes required & closing holes afterwards
- Site Electrical (temporary supply & electrical interferences) requirements
- New SG preparation – Provide Artisans / semi-skilled
- Site Establishment (Provision of offices, furniture, etc.)
- Supply RP labour to AREVA – hanging of lead blankets
- Commissioning assistance to AREVA.
- Supply and operation of jib crane in reactor building
- Rigging activities

PIPING & BOP

The current REIPP has been focussed on cost, not REAL localisation! Lets think about the future !

- **The current REIPP a success?**
  - Costs have been falling – YES, wind and solar PV
  - Owners of plants (local and foreign) benefitting for the long term – YES
  - Local banks benefitting – YES
  - Foreign entities dominate supply of equipment (blades, towers, PV panels) – YES
  - Foreign EPC companies taking on the principle contract – YES, providing financial guarantees – YES
  - Projects reaching FC close now a concern? Industry like cannot stop start.
- **BUT, what about:**
  - Broad based contribution to the economy and industrial participation for local industries?
  - Sustainable job creation locally and WHAT jobs !?
    - Engineers, planners, cost controllers, procurement, quality control, semi skilled…
  - What additional infrastructure if any has stimulated the economy? Schools, hospitals, malls, tourism, FET colleges etc ?
  - Where has the R300 billion gone to? How much of it stayed in the South African fiscus and where did it go ?
  - With foreign EPC's, margin on procurement has gone "foreign"; Engineering done where?
  - Foreign banks willing to provide greater flexibility on lending terms that is not carried through by local banks

Baseload Scenario in South Africa

- Ageing coal fleet needing to be replaced; Eskom still a dominant player
  - Medupi and Kusile – localisation and infrastructure development
  - More Coal? Coal IPP round 1 , 2500 MW available, 900MW bid (2 projects)
    - Water challenge in South Africa for cooling of coal plants
    - What localisation will transpire vs Eskom build programmes?
    - Risk on EPC bidders on price; R85 cents per kwhr, will projects reach FC?
- Nuclear programme is set to benefit the South African economy directly, indirectly and downstream more so than any renewable projects.
  - Nuclear plants create the largest workforce annual income based on both large capacity and being a labor-intensive technology.
  - Concern on costs but without an RFP South Africa does not know what risks foreign vendor countries are willing to take
    - Energy consumers have a legitimate concern; but risks can be ring fenced
    - Macroeconomic factors on labour; lessons learnt from Medupi/ Kusile.
- Would South Africa gamble on gas? Opportunities for localisation do exist but not as much as Coal and Nuclear

Nuclear Example: Localisation driven by level and scope

- ***Investment and complexity*** +

Existing qualification or possible to acquire

- Earthworks & Foundations
- Concrete and rebar supply
- Intake and outfall construction
- Auxiliary buildings
- Substations
- Piping, Valves, Pumps
- Installation Work, Cranes
- Fire Fighting Equipment
- Cable trays
- Steel Containment Liner (welders)
- Stainless Steel Pools (welders)

Minimum investment or time needed to qualify

- Pumps
- Valves
- Filters
- Vessels
- HVAC
- Pipe Fabrication
- Motors
- Transformers
- MV & LV Switchgears
- Junction Boxes
- Heat Exchanger
- Engineering
- Power Cable

Significant investment needed

- Fuel Fabrication
- Spent Fuel reprocessing
- High level waste storage
- Steel works (critical)
- Heavy forgings
- Reactor Pressure Vessel
- Steam Generator manufacture
- Polar Crane
- Safety & Operational I&C
- Main auxiliaries pumps
- Main Control Room
- Emergency Diesel Generators

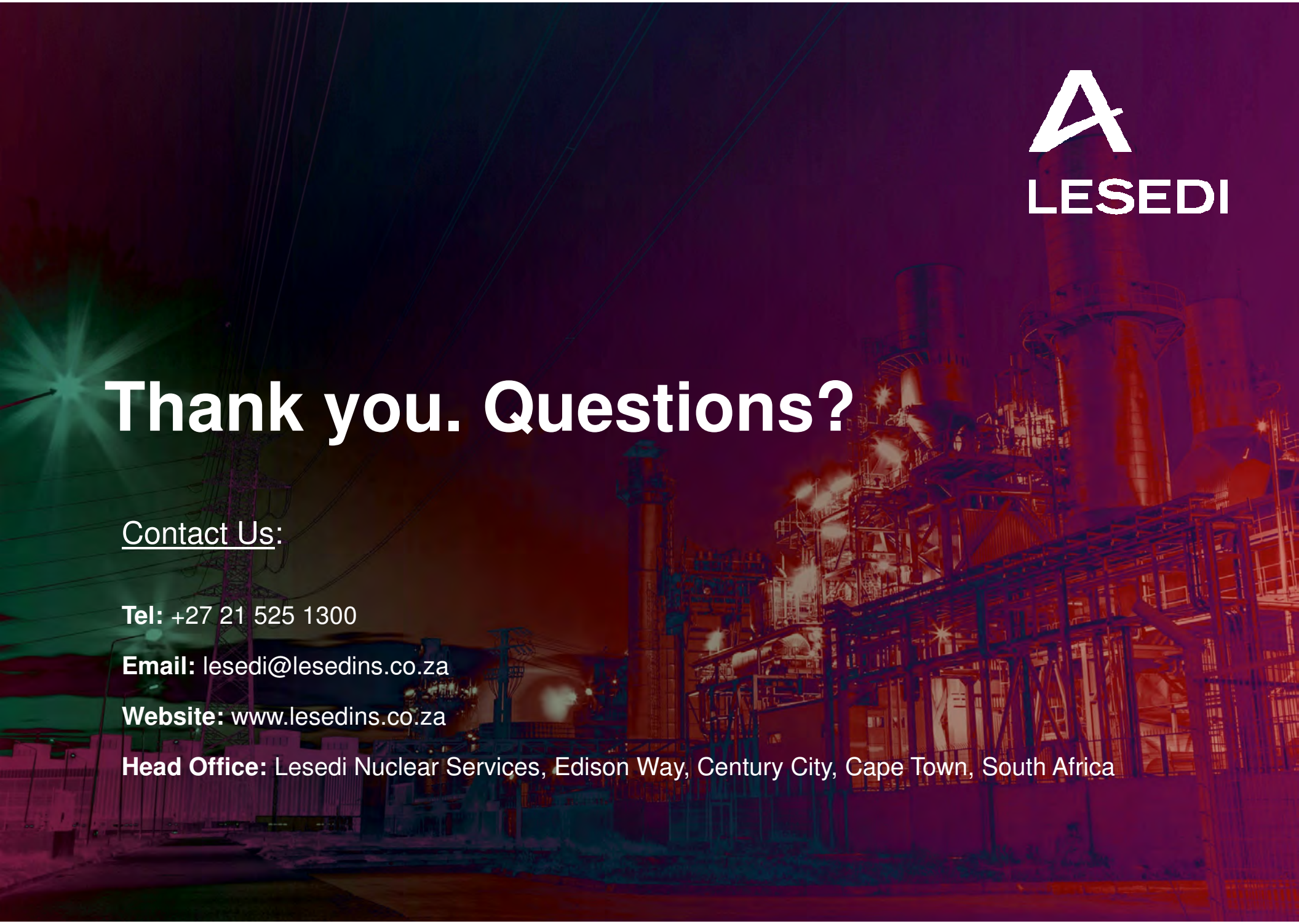
Relevant number of units

Program size, industry maturity and government's investment drive level of localisation

Recommendations

- Study on Economic Benefits Base load Programmes
  - IMPLAN Model Reveals Significant Economic Benefits in the USA for Nuclear power plants
    - http://www.nei.org/corporatesite/media/filefolder/policy/papers/jobs.pdf
  - What could transpire in South Africa to benefit our economy, create meaningful sustainable jobs directly and indirectly ?
    - Rands staying in the Fiscus; what are the multiplier effects ?
    - What is being localised? Large OEM's taking on principle contracts, civils obvious, mechanical erection, peripheral contracts insufficient
    - Large foreign EPC's/ Vendor countries and their willingness/ track record to localise
    - A roadmap to localisation; risks compromising the project are held by which stakeholders? Eskom, vendor country, OEM, EPC, local companies balance sheets
- A "SARS" type organisation to monitor and enforce localisation
  - Termination points being negotiated out the foreign EPC contracts
  - Poor legislation and policies have loop holes all over ! BBBEE landscape
  - Commercial topics; new BBBEE, Public Procurement Act

Privacy Policy



LESEDI

Thank you. Questions?

Contact Us:

Tel: +27 21 525 1300

Email: lesedi@lesedins.co.za

Website: www.lesedins.co.za

Head Office: Lesedi Nuclear Services, Edison Way, Century City, Cape Town, South Africa