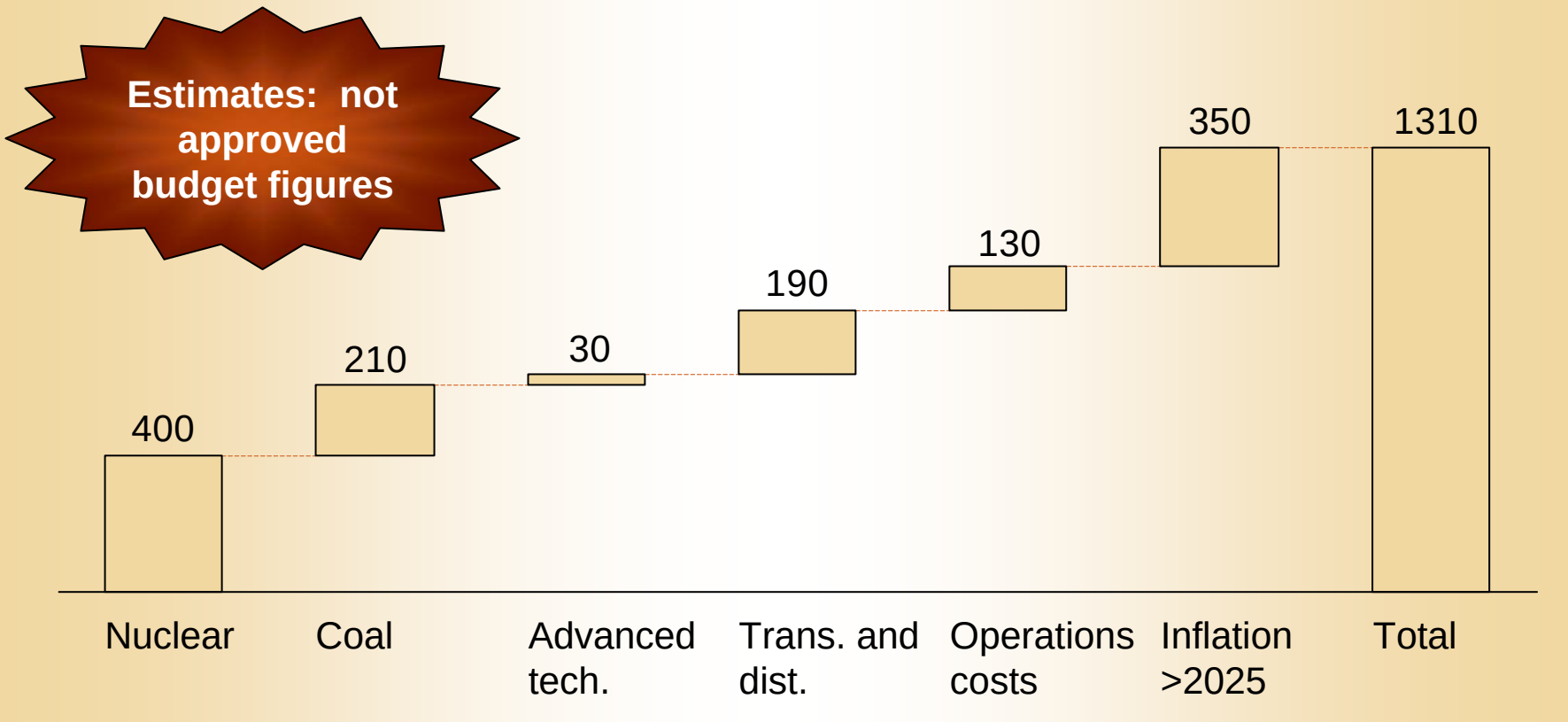
THE SOUTH AFRICA POWER PROJECT (TSAPRO) STRATEGIC IMPLEMENTATION PROPOSAL

Disclaimer: This document has been approved by The South Africa Power Project Advisory Committee. It is yet to be presented for approval by the governance structures of the State Owned Enterprises

SOUTH AFRICA WILL SPEND ~R1.3tn ON POWER CAPACITY OVER THE NEXT TWO DECADES

Estimated South African capital spend for 40GW of capacity to 2025
Rbn



Source: TSAPRO team analysis

THE INTRODUCTION OF NUCLEAR AS BASELOAD CREATES A NUMBER OF CHALLENGE…

Challenges

- Secure a fuel supply
- Secure access to architecture, engineering and component design technology through transfers
- Develop the skills to procure, operate, maintain and, where necessary, adapt the designs of these plants
- Have the national manufacturing capability to supply parts for the plants, and ideally components for our own and other build programmes

The need to respond to these challenges is reflected in the Nuclear Energy Policy

Source: TSAPRO team analysis

DEVELOPING AN INDUSTRY AROUND NUCLEAR MANUFACTURING HAS DIVERSE ADVANTAGES FOR SA

- Scale of SA's procurement gives leverage to access nuclear technologies and OEM supply chains
- High growth potential of global markets and bottlenecks in the supply chain means there is significant export potential

- Less carbon intensive technology than coal
- Does not require extensive mining operations

- High quality jobs for artisans, university and highly specialised skills
- Makes use of existing world-class nuclear skill base

- Ability to extract synergies from and for the PBMR program
- Opportunity to become a high-tech knowledge economy
- Local energy supply secured through local participation in full value chain

Source: TSAPRO team analysis

TSAPRO'S OBJECTIVE IS TO LEVERAGE THE POWER BUILD TO DEVELOP A POWER INDUSTRY CLUSTER

Co-sponsors:
- **DPE**
- **Eskom**

Participants:
- **DME**
- **DST**
- **dti**
- **PBMR**
- **Necsa**

Problem statement

- What intervention is required to secure baseload power supply?
- How can the new build be leveraged to achieve industrialisation objectives?
- What is the role of government, SOEs and the private sector in this process?
- What is the likely impact of the program?

Vision

"To establish an integrated and sustainable power industry cluster to meet the long term needs of South Africa and export markets"

THE TSAPRO STRATEGY INVOLVES COORDINATING INVESTMENTS WITH THE BUILD PROCESS

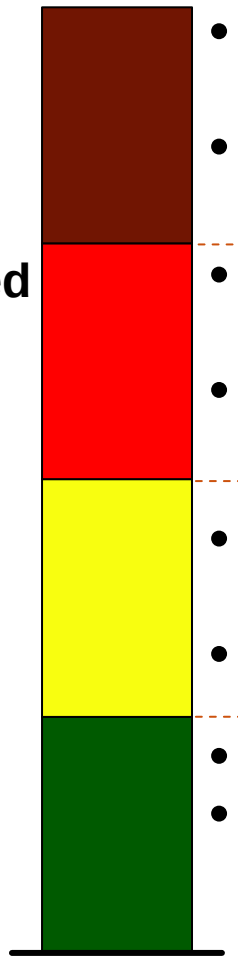
Coordination of investments and stakeholders

- Government has critical coordination role and provides significant financial support in targeted areas

Key Investment Areas

New power capacity	• Standardised capacity expansion provides basis for large-scale production by suppliers
Industrial Development	• Long-term industrial partnerships enable technology transfers and capacity expansion
Skills	• Comprehensive skills development in systems engineering and heavy manufacturing.
R&D and technology	• Local knowledge base built through technology transfers and large R&D investments
Architectural capacity	• Establishment of local system design and architecture capability, particularly in nuclear, as coal capability exists

REQUIRED INTERVENTIONS ARE DETERMINED BY DEGREE OF INDUSTRIAL COMPLEXITY

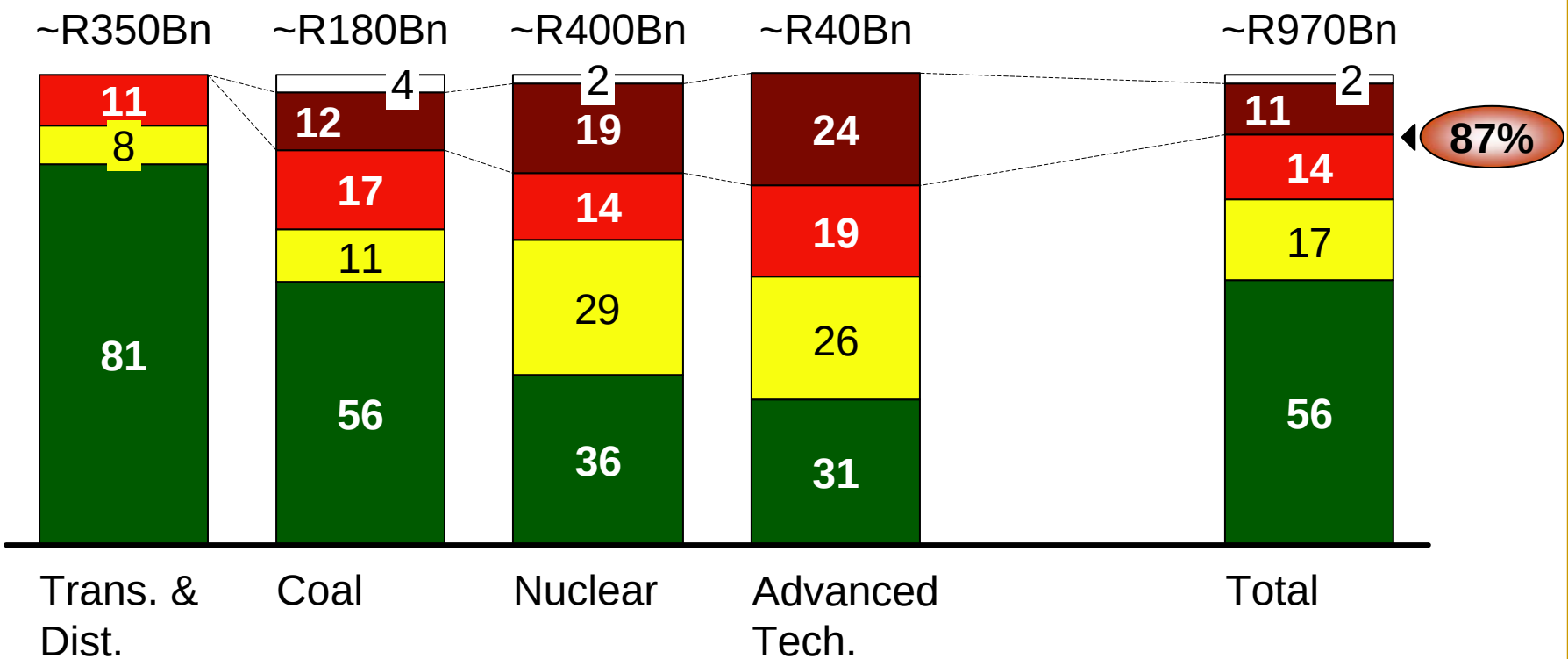


	Examples	Intervention requirements
Globally leading	• Ultra heavy forging • Pipe milling	• Government driven investments for strategic economic purposes – not commercially viable in short-medium term
Advanced	• ASME III production facility • High voltage switchgear	• Commercially viable but high complexity - government investment required in specialised skills and technologies to enable investment
Inter-mediate	• Pipe prefabrication • Gas cycle system	• Investment requirements within capability of company balance sheets, but clear medium term commitment required
Shallow	• Construction • Structural steel	• Within current industry capability • Sufficient notice required and information sharing to enable capacity expansion

TSAPRO ANALYSIS SUGGESTS THAT 87% OF EXPENDITURE CAN BE CAPTURED

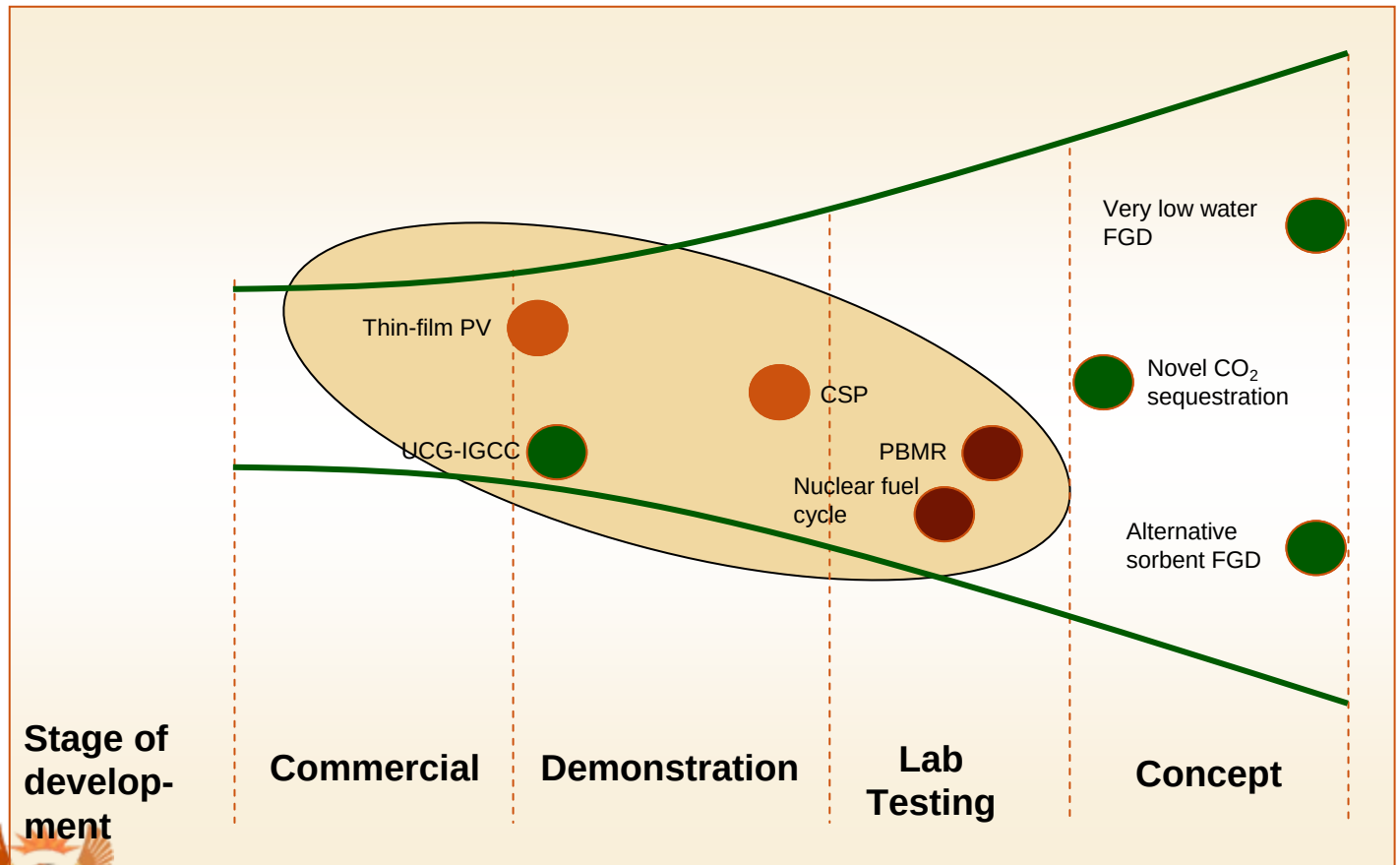
Local supply classification 2007-2025

% spend



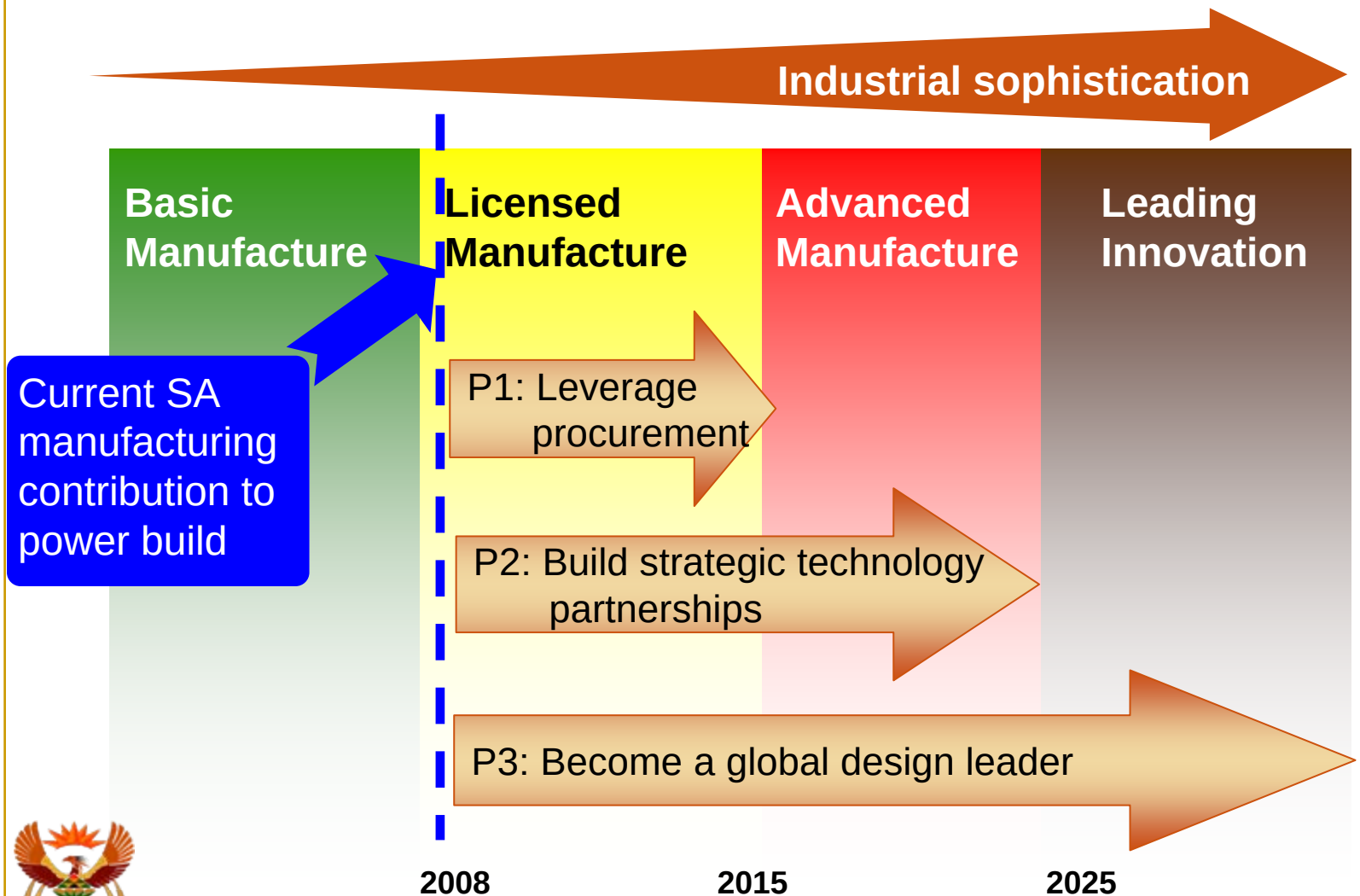
AN R&D PORTFOLIO FOCUSSED ON LIMITING GASEOUS EMISSIONS WILL ALSO BE REQUIRED

Stage of development of priority technologies in South Africa



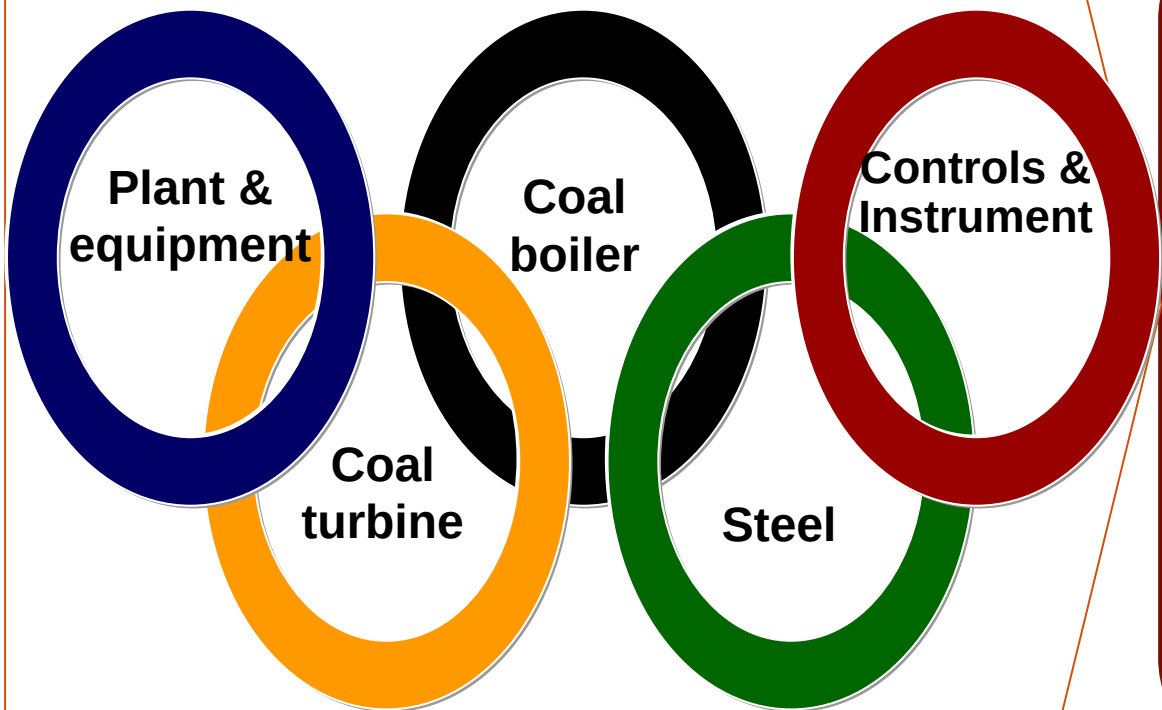
PWR technology will be mastered through a technology transfer, rather than through local R&D.

THE IMPLEMENTATION OF THE TSAPRO STRATEGY IS BASED ON THREE PARALLEL PROGRAMS



PROGRAM ONE, LEVERAGE PROCUREMENT, WILL BE DRIVEN BY THE ESKOM CSDP 08-13

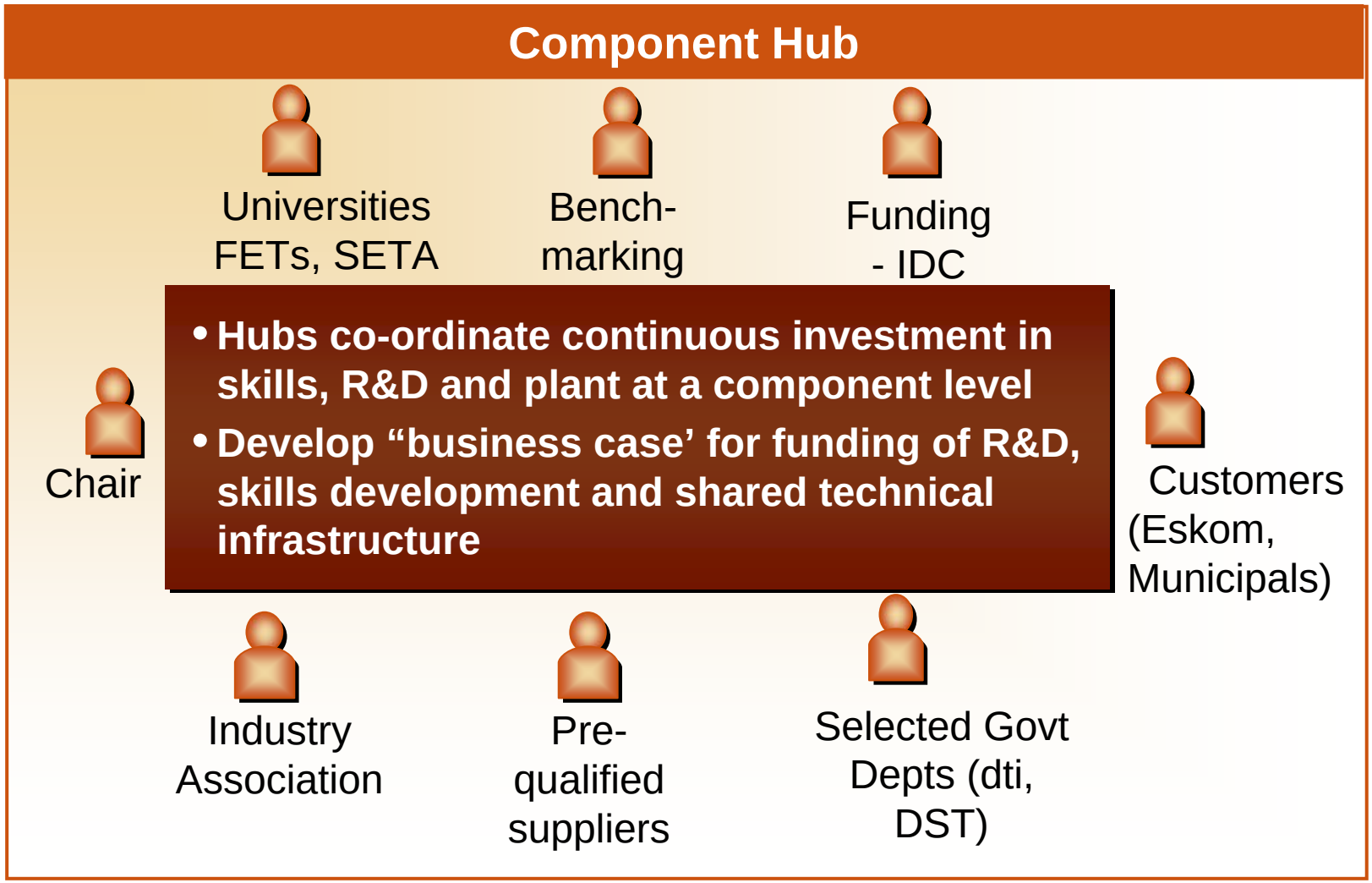
5 priority industry groups
(76% of Manufacturing Spend)



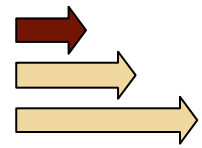
- CSDP 2008 aims to increase local supply of priority components to 91% by 2013 from 69% in 2008
- Export value of these components could reach R1.5 bn as early as 2013
- The net positive impact on SA balance of payments if targets are met will be R13.5 bn

AIMS TO INCREASE LOCAL SPEND ON PRIORITISED COMPONENTS IN 5 INDUSTRY GROUPS BY 22%

COMPONENT HUBS WILL BE ESTABLISHED IN EACH PRIORITISED GROUP



PROGRAM ONE ALSO INVOLVES ARTISAN DEVELOPMENT



Industry Leadership

Eskom

Aligns stakeholders behind common industry approach.

FET colleges

Provides theoretical and laboratory training aligned with industry needs

Contract Negotiations

SETA

- Funds work placements with levy
- Accredit examiners

Adopt FET colleges

Commit to work placements

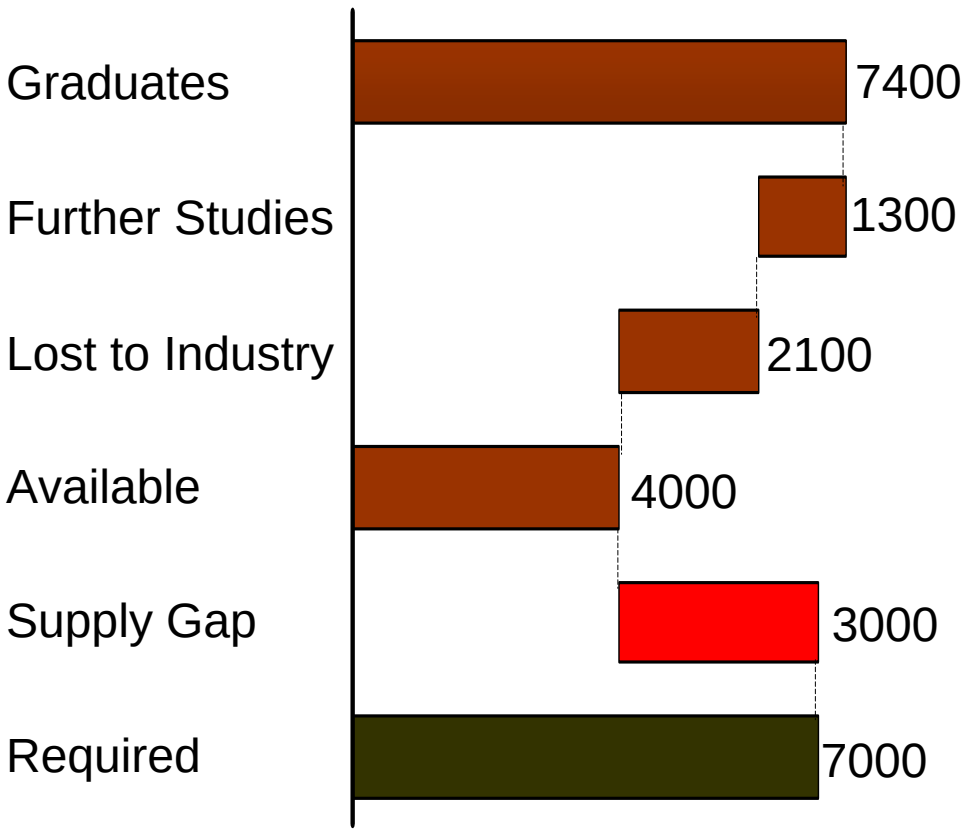
Key Suppliers

Objective to train 18,000 artisans per year to meet sector requirements

Eskom

PROGRAM ONE WILL FOCUS ON RETAINING ENGINEERS AND SCIENTISTS

Higher Education: Annual Supply and Demand



Initiatives

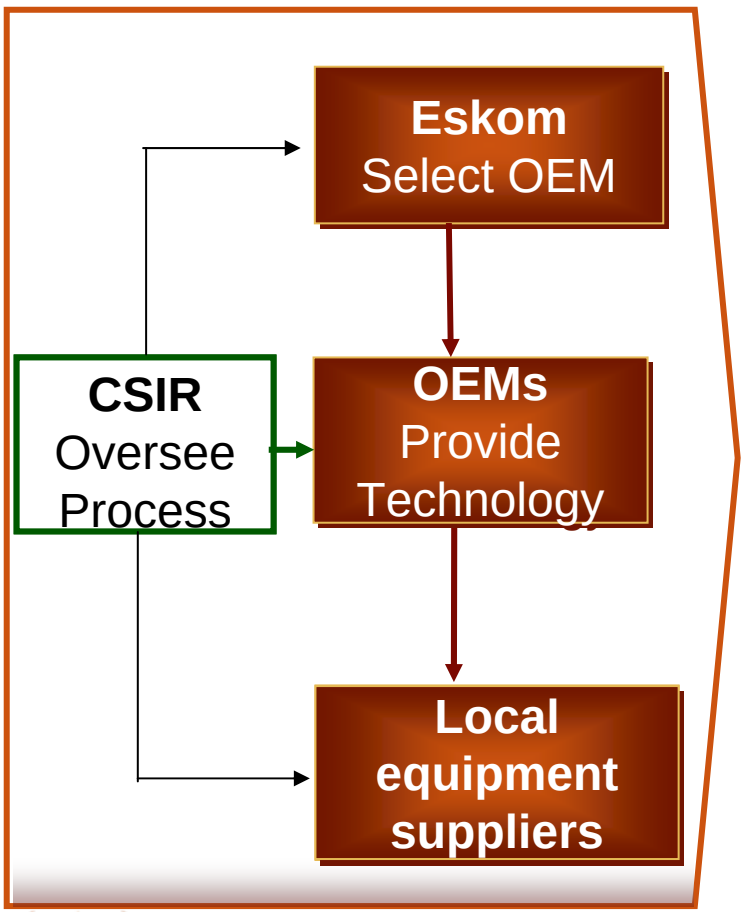
Short Term

- Focus on reducing loses to industry through
  - marketing world class industry vision
  - partnering OEMs to provide global work-placements.
- International recruitment

Medium Term

- SOE partnerships with universities
- Leverage bilaterals with supplier countries to boost supply

PROGRAM TWO WILL BE DRIVEN THROUGH STRATEGIC PARTNERSHIPS WITH KEY OEMS



- A range of technology transfers are required:
  - Systems/ architecture
  - Component manufacturing
  - Fuel cycle.
- OEM partner works closely with Eskom and local suppliers to transfer IP, equipment, data and skills across supply chain
- CSIR project manages the transfer, including carrying out capability and readiness audits to ensure transfer is ambitious but achievable
- CSIR and Eskom work together to ensure suppliers are ready for transfer and contractual obligations are met by OEM and all suppliers

TECHNOLOGY TRANSFERS WILL REQUIRE SPECIALISED SKILLS

Key elements to be transferred during technology transfer process

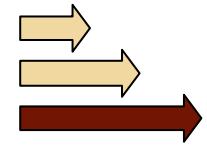
- Drawings
- Computer code
- Processes (certification, quality, etc.)
- Machinery

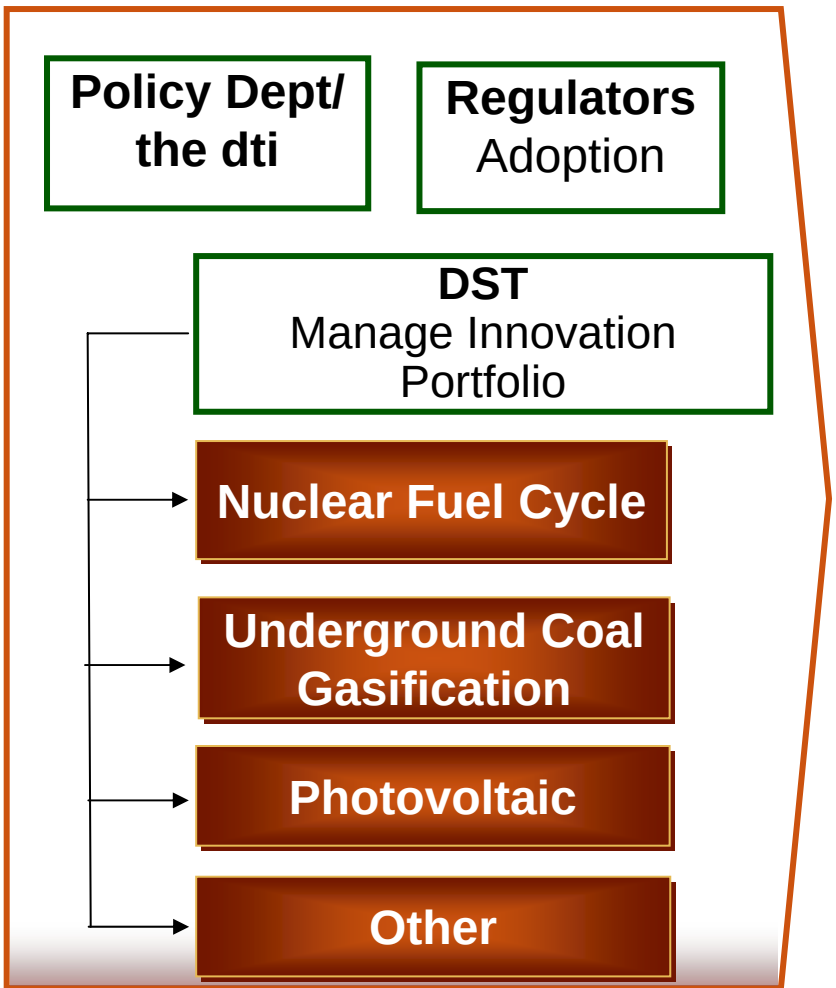
Specialised skills will be required to receive the technology

- For example, nuclear equipment suppliers will require specialist fluid systems design engineers
- Training mechanism will need to be established that ensures training of specialised skills required

The technology transfer process is an active process of absorption and customisation.

PROGRAM THREE, THE INNOVATION PORTFOLIO WILL BE MANAGED BY DST



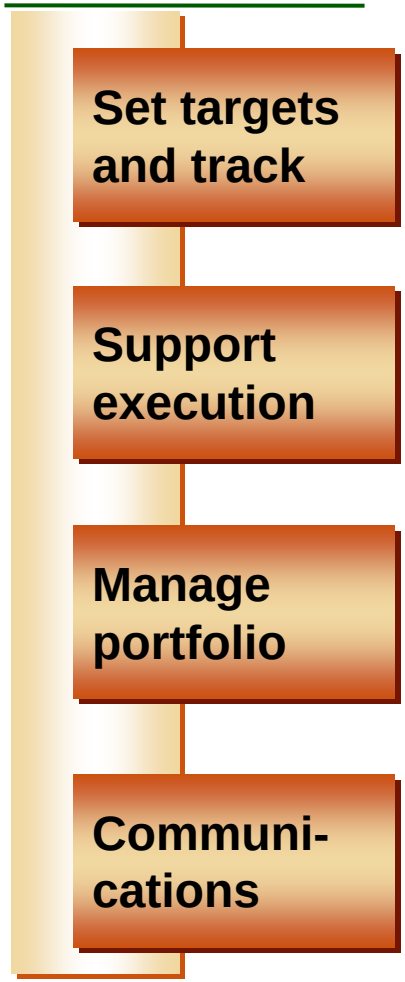


- Policy Departments and the dti ensure alignment with future energy mix and industrial policy
- DST manages central energy technology portfolio, monitoring all national energy technology initiatives
- Regulators implement a tariff regime to incentivise utilisation of DME technology portfolio as commercialisation stage reached.
- A number of sources of funding including: DST, DME and SOE R&D spend.

A RANGE OF DEPARTMENTS AND AGENCIES WILL BE REQUIRED FOR OVERALL IMPLEMENTATION

Shareholder organisation	Implementing organisation	Responsibilities
DST	• CSIR	• DST manage technology development portfolio and technology funding • CSIR to manage technology transfer
The dti	• IDC	• Continuously review incentives offered for power cluster development and fund industrialisation
DoL / DoE	• Setas, FET, Universities	• FET to provide formal training • Setas provide work-placements and funding
DME	• Necsa, NERSA, NNR	• Establish enabling policy, regulatory and accreditation regime for industrialisation • Necsa drives nuclear fuel cycle capabilities
DPE	• Eskom, PBMR	• Manage OEM contracts for industrial development • Provide leadership to component hubs and skills cluster

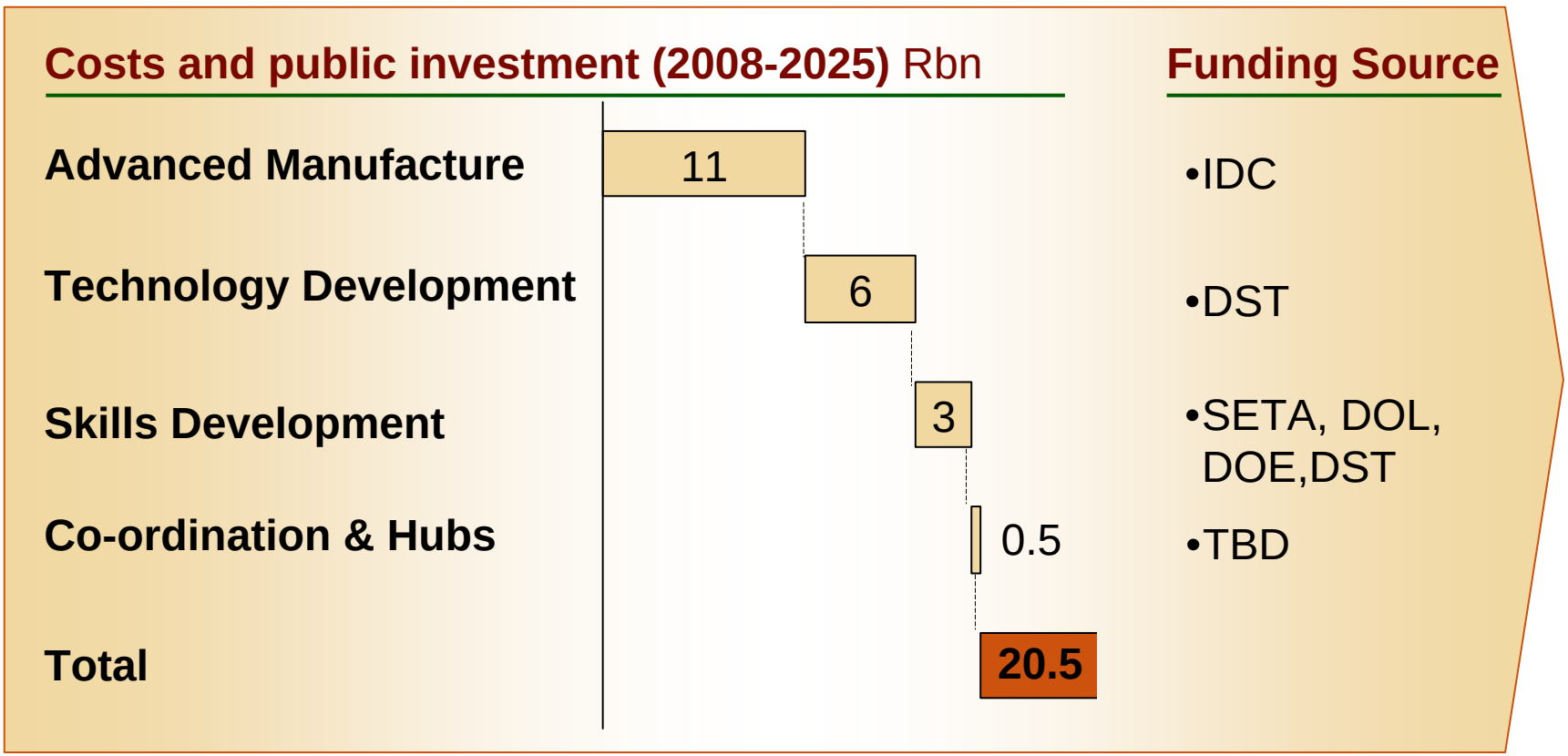
CONSEQUENTLY, A OVERARCHING COORDINATION MECHANISM WILL BE REQUIRED



Function	Description
Set targets and track	• Co-ordinate setting of baselines and targets • Track KPIs and milestones
Support execution	• Produce progress reports • Hold progress meetings with project teams and escalate issues where necessary
Manage portfolio	• Establish project master plan • Prepare overall risk and mitigation plans
Communi-cations	• Define and implement communications strategy.

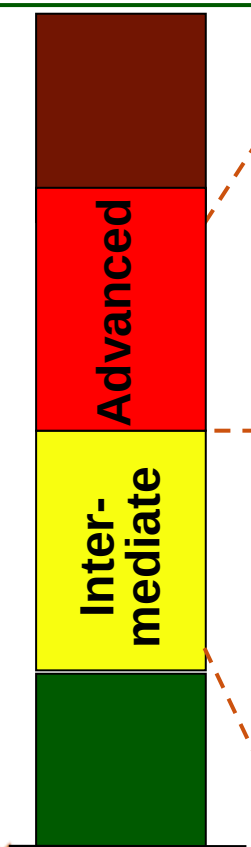
Source: TSAPRO team analysis

R20.5BN NEEDS TO BE INVESTED OVER THE NEXT 17 YEARS FOR AN ADVANCED POWER CLUSTER



- **Cost of cluster development is less than 2% of new build spend**
- **Excludes nuclear fuel cycle and PBMR**

EXISTING FUNDING MECHANISMS ARE LARGELY SUFFICIENT FOR THE PROGRAM.



Industrial complexity	Funding Source	Funding Status	Comment
Advanced	• DST to fund technology development and technology transfer		•Requires additional R300m/yr – incentive fund may be required
Advanced	• IDC equity funding for industrial plant		•IDC balance sheet sufficiently strong
Inter-mediate	• DST/DTI to fund component hubs and coordination.		• .Requires additional R30m/yr
Inter-mediate	• IDC and commercial banks debt funding		• IDC balance sheet adequate
Inter-mediate	• FET / SETA		• Possible higher education shortfall.

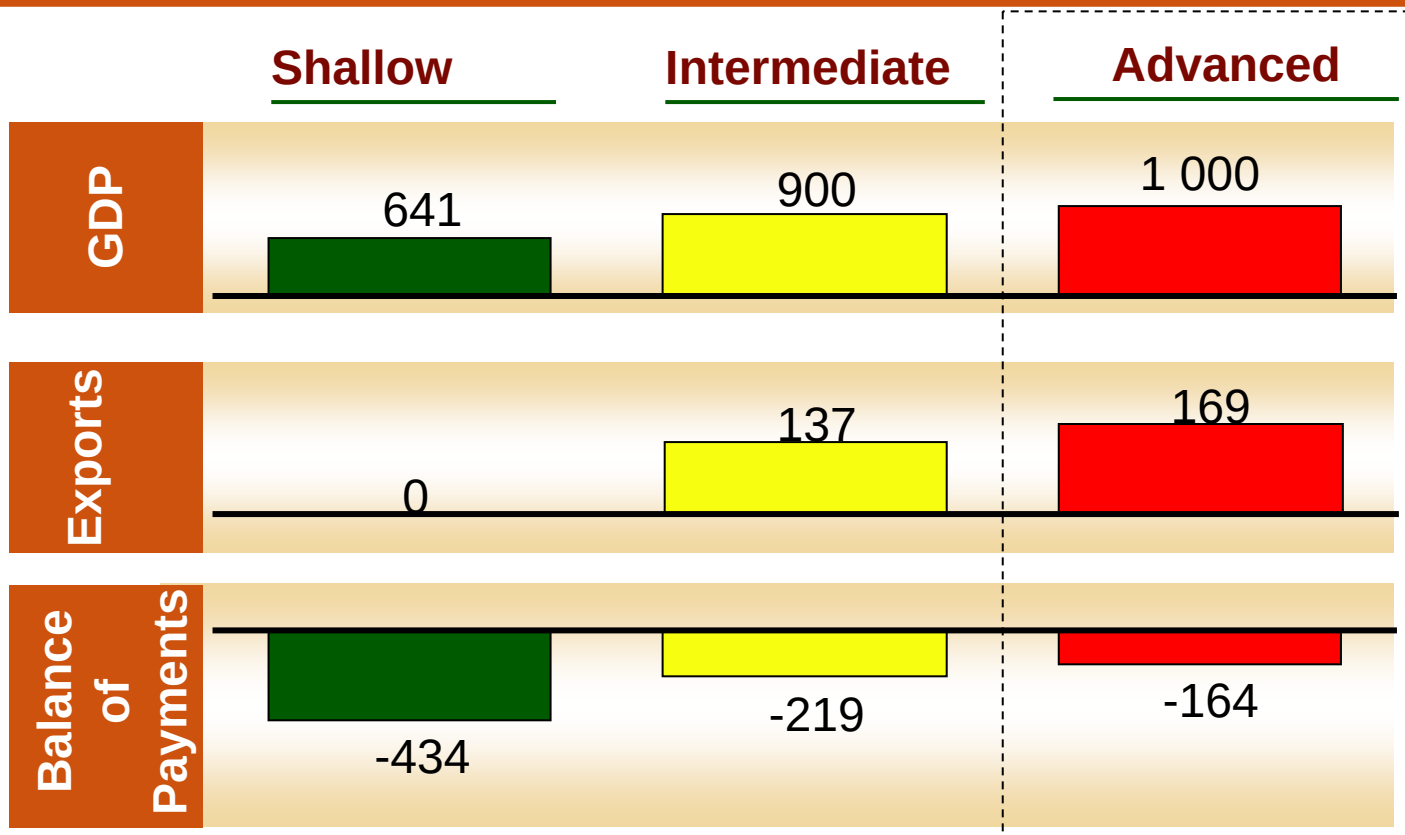
● Sufficiently funded ○ Not funded

A POWER CLUSTER TECHNOLOGY DEVELOPMENT INCENTIVE FUND MAY BE REQUIRED

	Description
Fund focus	• Technology transfers covering: – Specialised skills development – Costs of soft technology (e.g. codes, diagrams and process definitions) • Research and development projects in TSAPRO areas
Initial fund amount	• R1bn
Conditions	• 50/50 grant funding • Based on auditable definition of output of technology transfer or R&D process
Management responsibility	• DST

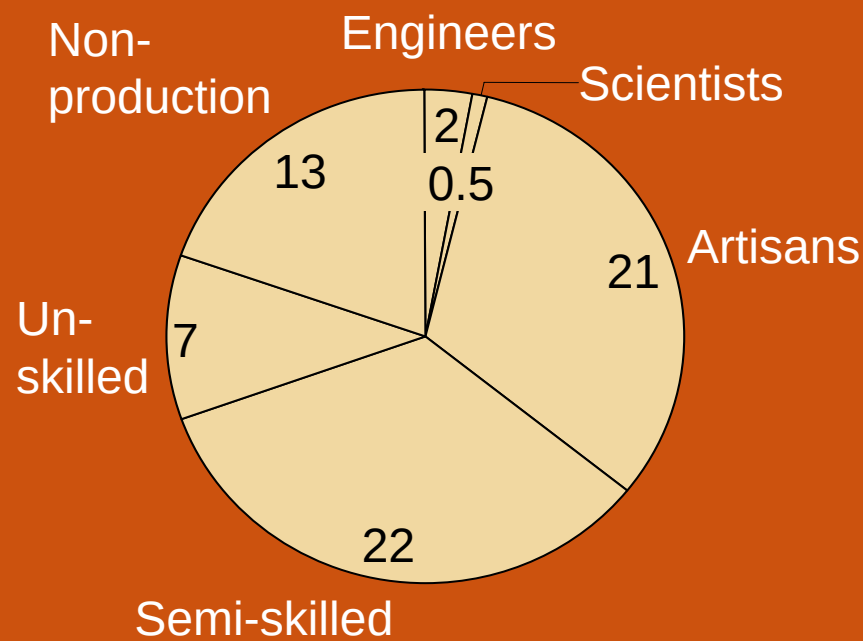
SUCCESS SHOULD HAVE SIGNIFICANT ECONOMIC IMPACT

Economic impact



INCLUDING SIGNIFICANT SKILLS DEVELOPMENT AND JOB CREATION IMPACTS.

Peak skill requirements
Number of employees ('000s)



Total Jobs at Peak: 66,000