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Developing green trade and industry opportunities in South Africa

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Trade and Industrial Policy Strategies (TIPS)

PAGE PARTNERSHIP FOR ACTION ON GREEN ECONOMY

TIPS

Outline

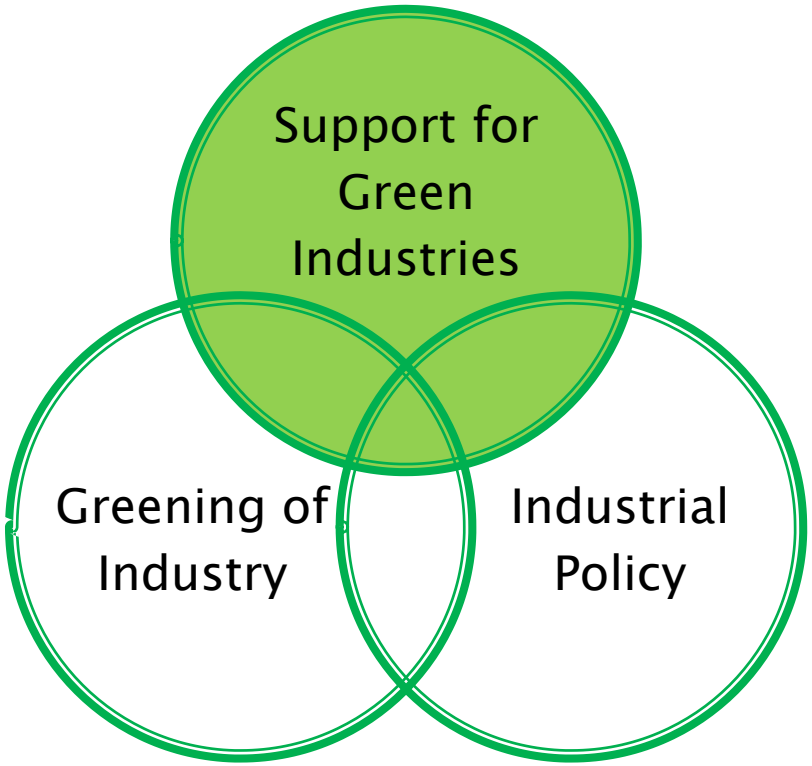
1. Introduction
2. Background and trends on green trade and industry
3. Scoping: Policy priorities
4. Scoping: Trade analysis
5. Scoping: Stakeholder consultation
6. Conclusions

1. Introduction

- Global transition to a green economy underway, as a response to multiple crises of sustainability, including climate change
  - The Paris Agreement indicates the direction of travel
- South Africa has entered this transition and is determined to seize associated opportunities
- Numerous policy signals:
  - In broad policy documents (NDP, NGP, IPAP, Innovation Plan, etc.)
  - Through green-related policy documents (NSSD, NCCRWP)
  - Through the development of sector strategies (GE Accord, RE, green transport, etc.)
  - Through the development of 'green' strategies at all levels of government (national, provincial, municipal)
- The transition to a sustainable development pathway is not an environmental issue but a **socio-economic challenge** which has ramification at all levels of economic development, notably trade and industrial development
  - Implications in terms of *what is produced* as well as *how it is produced*

1. Introduction

- From a trade and industry perspective, two complementary streams, which go hand in hand:
  - development of new, green industries on the one hand, and
  - greening of existing, traditional industries on the other hand
- Results: upcoming and potential threats as well as opportunities, which are mostly sector specific
- This research focuses on the **development of new, green industries in South Africa**, both for import substitution and for exports
- Two phases:
  - Scoping
  - Focused investigation



Background and trends on green trade and industry

2. Background and trends on green trade and industry

- No definition or agreement on what constitutes green trade and industry (or its predecessor: environmental goods and services), internationally
- Globally, many different understandings of green trade and industry
- Multiple efforts to create a comprehensive list of Green Goods
  - OECD –122 products
  - APEC – 54 products
  - World Bank – 36 products
  - UNCTAD – includes services
  - WTO – changeable, 525 products as of 2009
- All efforts are the product of political processes
  - Focus on trade liberalisation
  - Primarily about promoting national interest
  - Debate over how green some products are

Green trade can be defined as the import and export of goods and services that are produced using green VCs with enhanced sustainability of transport, production, use, maintenance and end-of-life cycling . This entails the segment of EGS, including products for EE, RE, pollution control, water and wastewater, and organic agriculture (PAGE, 2015)

2. Background and trends on green trade and industry

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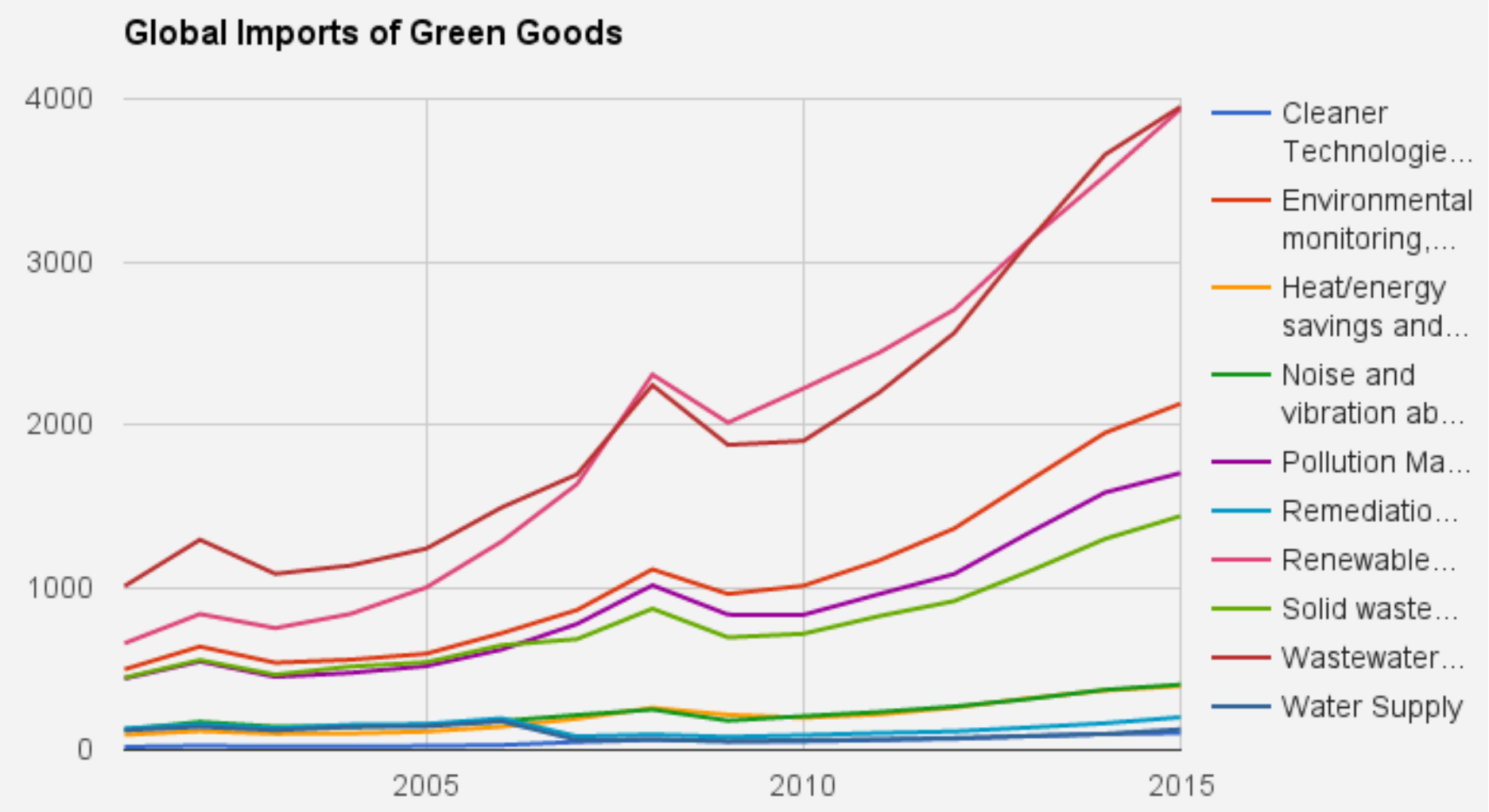
- In this research, a broad and open approach on green trade and industry is adopted (161 product lines and more)

Table 1: Broad green trade and industry categories

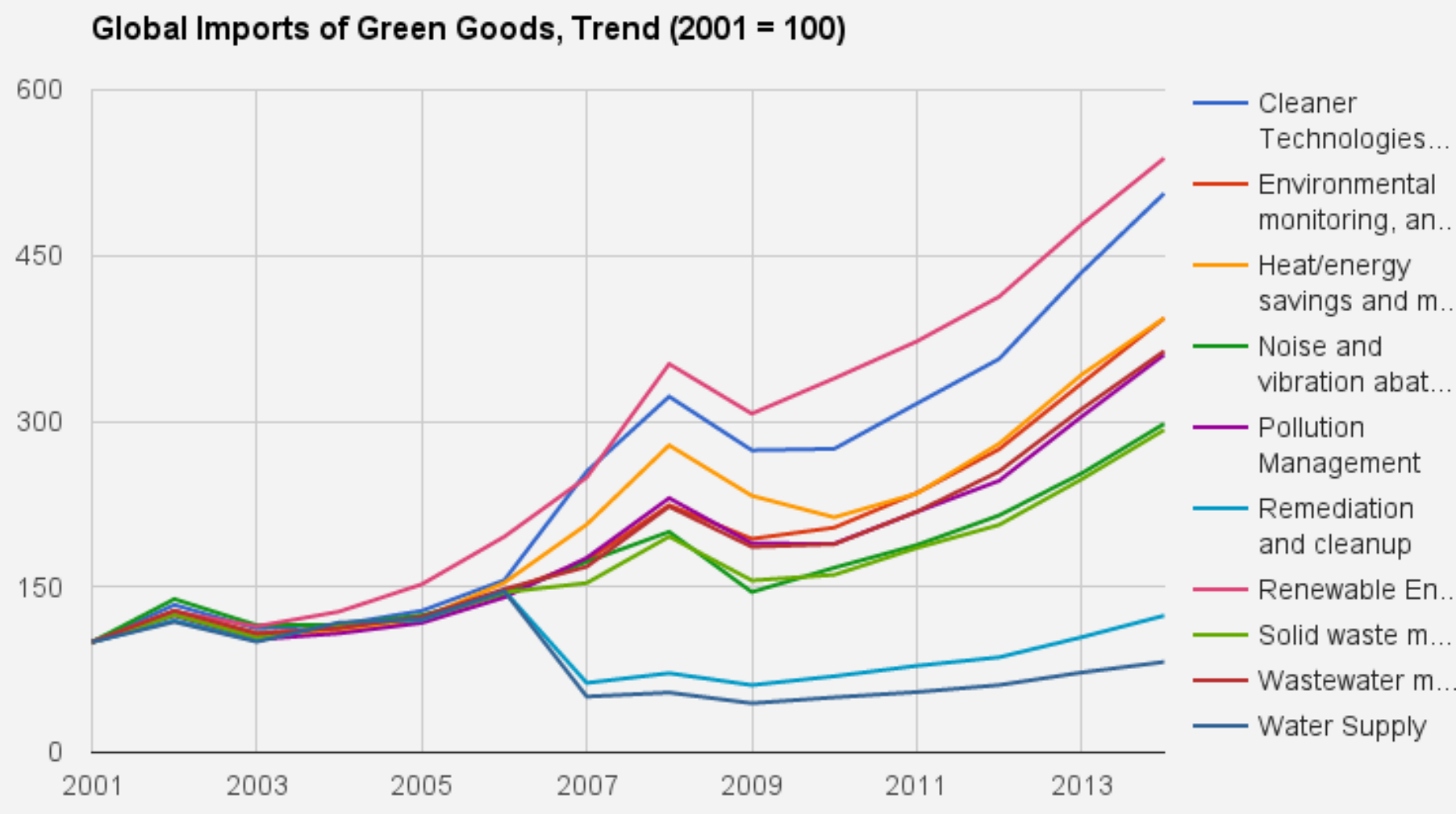
1. Air Pollution Control	7. Environmentally Preferable Products, Based on End Use or Disposal Characteristics
2. Management of Solid and Hazardous Waste and Recycling Systems	8. Cleaner or More Resource Efficient Technologies and Products
3. Clean Up or Remediation of Soil and Water	9. Natural Risk Management
4. Renewable Energy Plant	10. Natural Resources Protection
5. Heat and Energy Management	11. Noise and Vibration Abatement
6. Waste Water Management and Potable Water Treatment	12. Environmental Monitoring, Analysis and Assessment Equipment

Source: Author's composition, based on Wooders, 2009

2. Background and trends on green trade and industry



2. Background and trends on green trade and industry

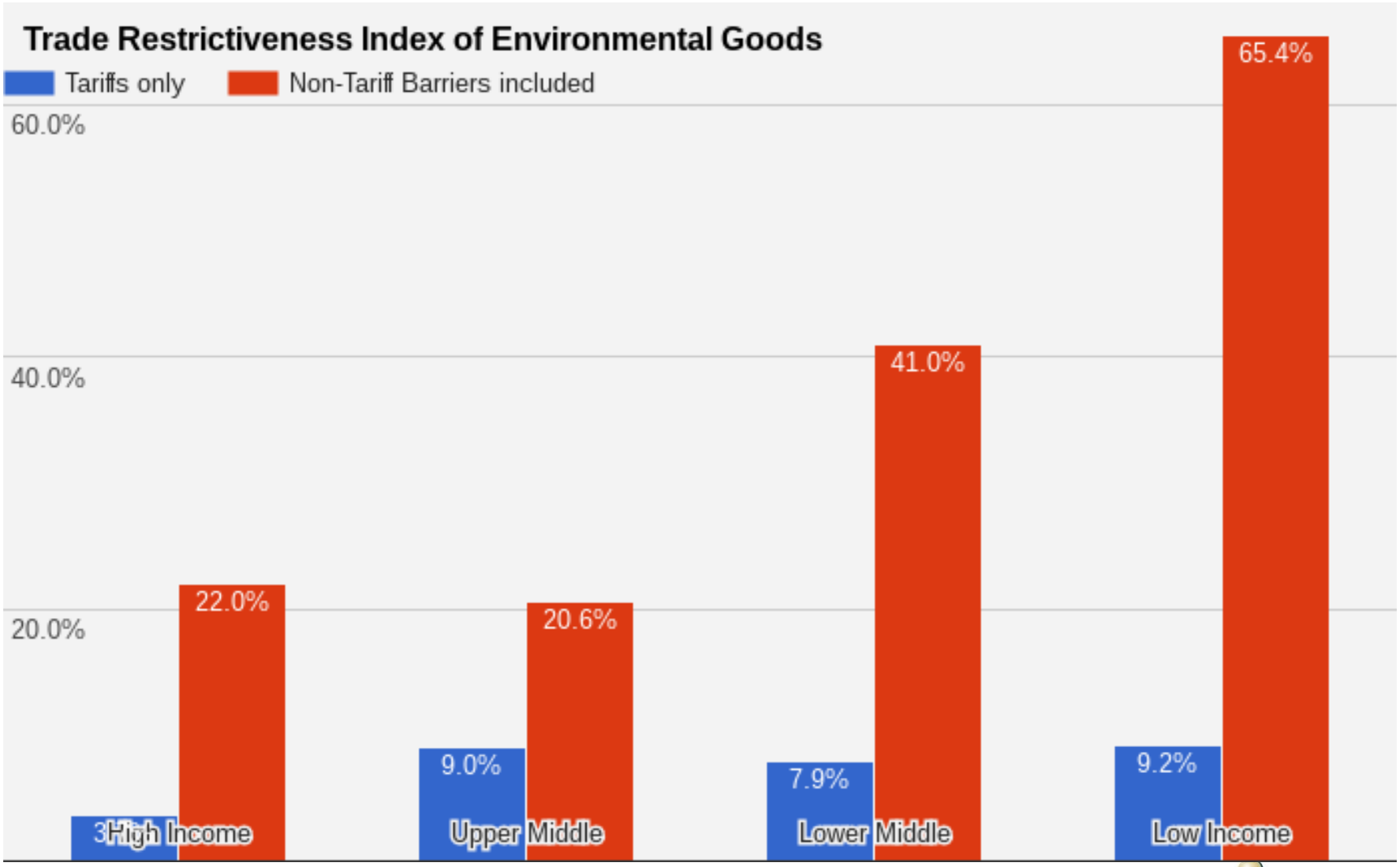


2. Background and trends on green trade and industry

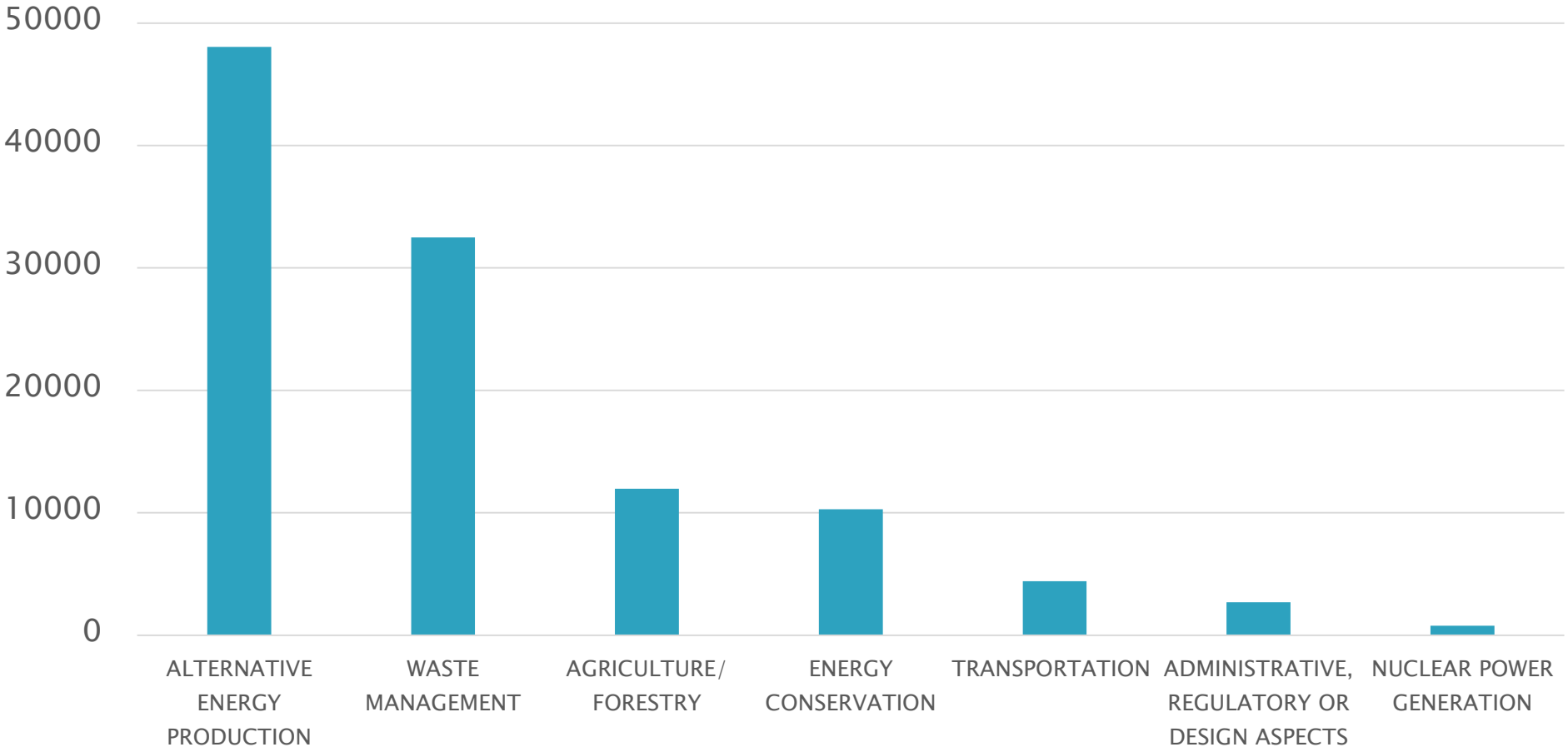
- Rapid growth of trade in green products, and still underdeveloped in many parts of the world.
- However: a complex market
  - Dynamic, rapidly changing technology
  - Certain products dominated by a few countries
  - Others extremely competitive environment
  - Driven by government intervention – includes local content, standards, other barriers
  - Issues of capability
  - Intellectual property crucial
- Barriers to entry of global market
  - New products but close link with existing industries
  - Large returns to R&D
  - Local Procurement programmes
  - Standards

Growth ≠ Opportunity

2. Background and trends on green trade and industry



South African patents based on IPC Green Inventory classification



Source: Data from CIPC

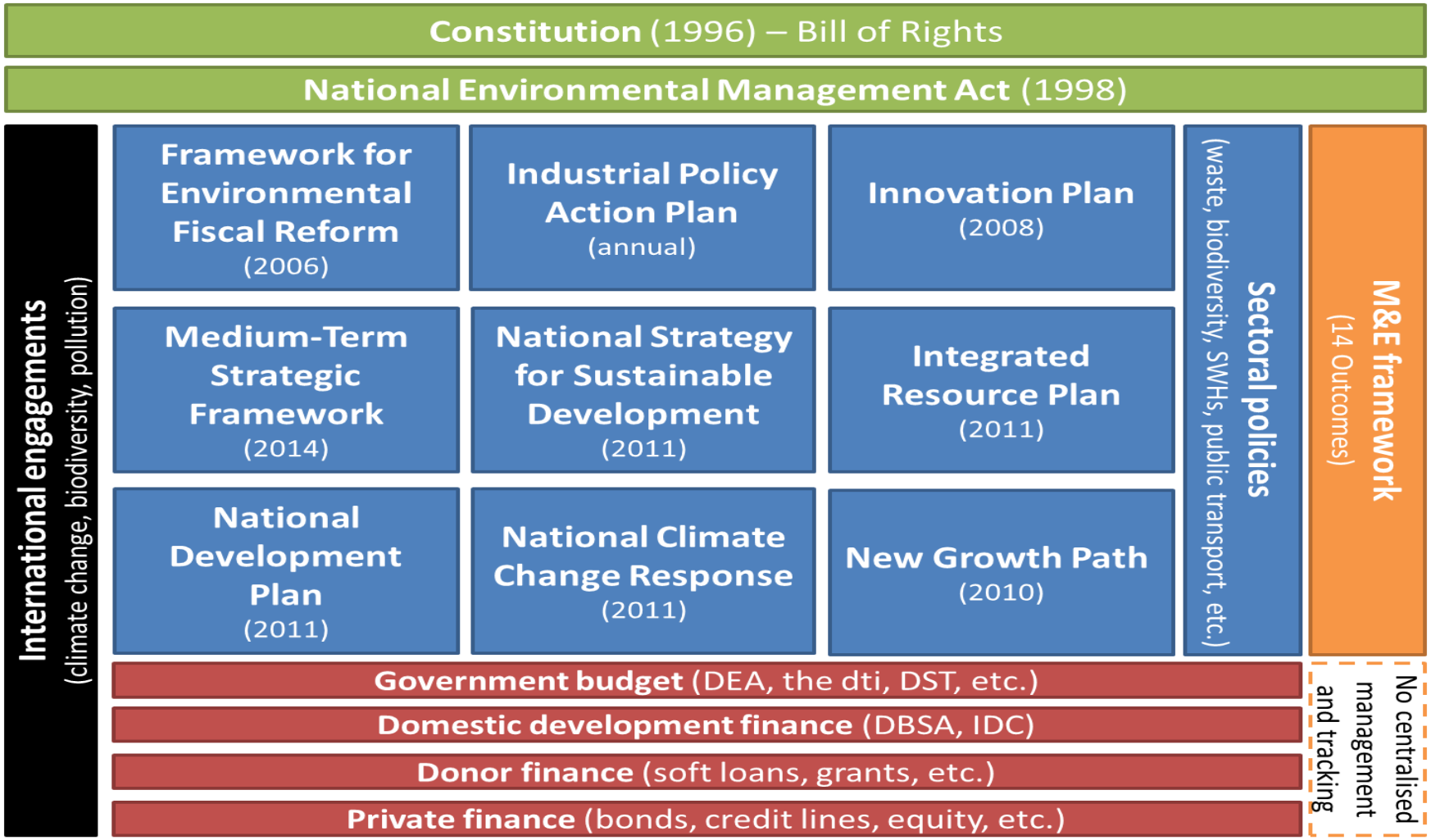
Scoping of green trade and industry opportunities: Policy priorities

3. Scoping of green trade and industry opportunities: Policy priorities

- Mirroring international development, no common understanding of what constitutes the green economy in South Africa
- Different departments / levels of government have different understanding and priorities
  - Areas of agreements: renewable energy, energy efficiency, sustainable transport
  - Areas of debate: nuclear energy, clean coal technologies, hydrogen economy

- Some sectoral policies emphasise the need to transition to a green economy, however the actual development of local industrialisation and export potential is not clear

3. Scoping of green trade and industry opportunities: Policy priorities



3. Scoping of green trade and industry opportunities: Policy priorities

	Document	Promotion of green industries / technologies	Promotion of green ISI	Promotion of green export potential
National	National Development Plan			
	Ten Year Innovation Plan			
	New Growth Path			
	Medium-term Strategic Framework 2014 - 2019			
	Industrial Policy Action Plans (IPAP)			
	National Export Strategy (summary of research findings)			
	The National Exporter Development Programme (NEDP)			
National (green related)	The National Strategy for Sustainable Development and Action Plan			
	Green Economy Accord			
	National Climate Change Response Whitepaper			
National (sectoral)	Integrated Resource Plan 2010 – 2030			
	The Energy Security Master Plan – Liquid fuels			
	Draft Position Paper on the South African Biofuels Regulatory Framework			
	Sector strategy: wind and solar			
	National Transport Master Plan			
	Green Transport Strategy (draft)			
	National Climate Change Response Strategy for the Water Sector			
	National Waste Management Strategy			

HIGH	MEDIUM	LOW	NONE

Document	Promotion of green industries / technologies	Promotion of green import substitution industrialisation	Promotion of green export potential
Industrial Policy Action Plans (IPAP)	Mentions the need to promote green industries	Green Industries such as organic agriculture (agro-processing), biofuels, buses and electric vehicles, and nuclear energy (advanced manufacturing) need to be developed for local production. Local content requirements in the REIPPP presents an opportunity for local manufacture of renewable energy (solar and wind) products and components	Green Industries such as organic agriculture (agro-processing), biofuels, buses and electric vehicles, and nuclear energy (advanced manufacturing) should be developed to grow exports. Natural fibre reinforced composites and catalytic converters. The African market should be targeted to grow exports.
Green Economy Accord	The opportunities in the green economy are many and varied	Local manufacturing, assembly, construction and installation of renewable energy plant and equipment. These include solar panels, trackers, mirrors, metal frames, glass, wind-turbine blades, towers, turbines and turbine components, electricity inverters, Solar Water Heaters (one million solar-water heating systems by 2014/15), collectors, metal frames, glass, geysers and piping. incandescent lamps with compact fluorescent (CFL) lamps or next-generation light emitting diodes (LED), electric vehicle and its batteries, bio-gas retrofitted public transport vehicles, solar-powered street and traffic lights.	Not specific on any green products but mentions that local manufacturing capacity's viability should be enhanced so as to export.
Sector strategy: wind and solar	Need to develop green industries by enhancing relevant R&D skills in the field	Some of the technologies with potential for local manufacturing are: concentrated PV, thin film PV, central receivers, and concentrated systems for industrial process heat applications. Components with high potential are modules, inverters, tracking systems, steel structures, cabling and transformers	The need to grow the export market share in the global solar and wind power sector supply- and value-chains. Regional export opportunities to address Africa's infrastructure and energy access backlog.

3. Scoping of green trade and industry opportunities: Policy priorities

- Numerous policy documents mention the transition to a green economy
- Most do not deal with issues of green trade and industry
  - They mention promotion of the localisation and export potential in general
- Only some directly tackle the issues of promoting green trade and industry
- Sectors / products that are being promoted by gov policies
  - Renewable energy (solar and wind) products and components
  - Energy efficiency
  - Fuel cells
  - Biofuels
  - Electric vehicles and components

Scoping of green trade and industry opportunities : Trade analysis

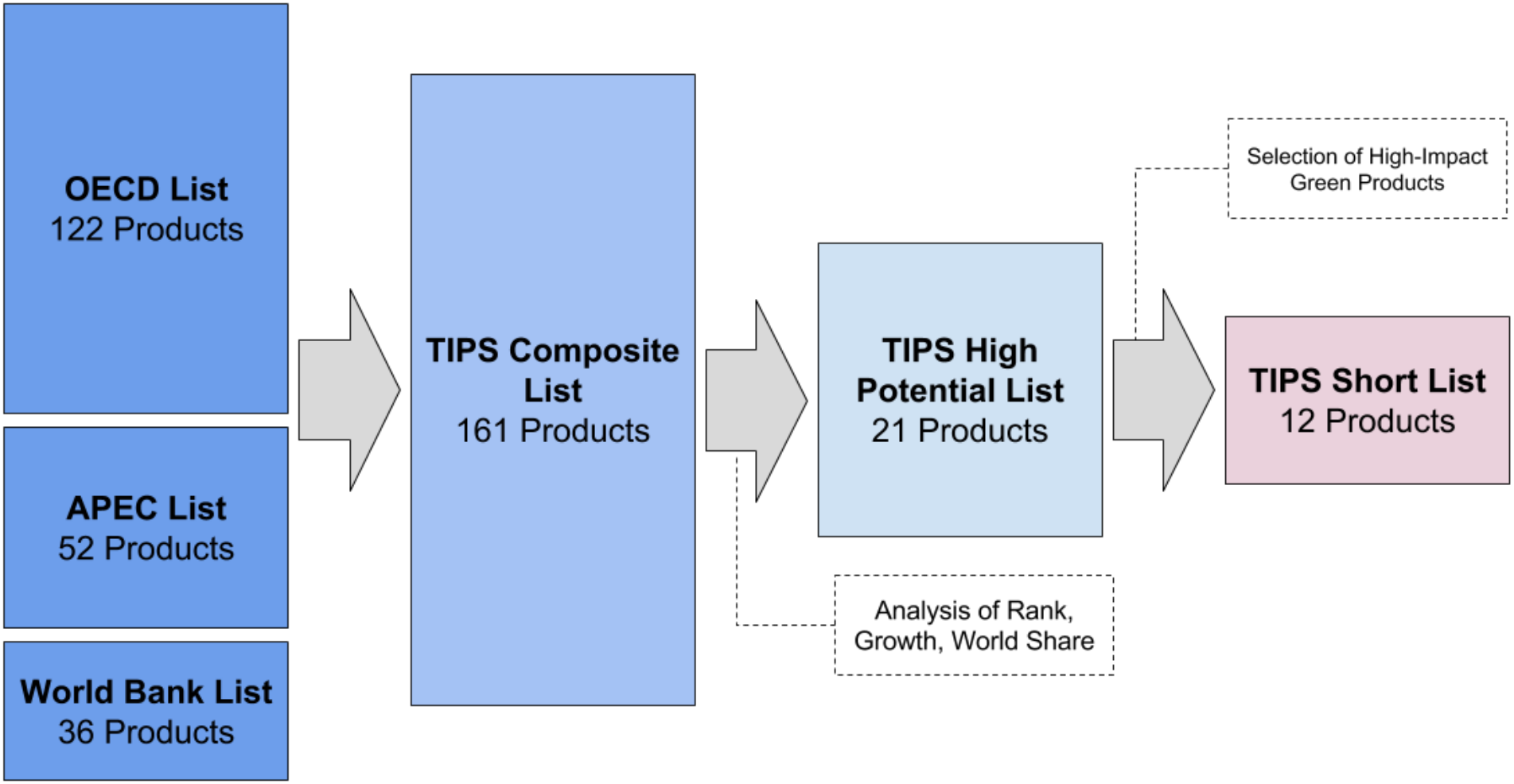
4. Scoping of green trade and industry opportunities : Trade analysis

- What can trade data tell us?
  - What is popular now
  - What productive capacity exists now (partly)
  - What is traded now

- Clear limitations on drawing conclusions
  - Dynamic space, rapidly changing
  - Multiple efforts to develop industries – localise and for export
  - Overlap in HS codes

- Our list
  - Start with a combined APEC, OECD, World Bank list
  - WTO excluded because not publically available, too large and contested
  - Test for volumes, growth, share.
  - Control for environmental considerations – eg Chemicals

4. Scoping of green trade and industry opportunities: Trade analysis



4. Scoping of green trade and industry opportunities: Trade analysis

Short List of South African Green Exports	
Machinery for mixing or kneading solid mineral substances	Recycling Equipment
Vapour generating boilers, incl. hybrid boilers	Biomass boilers
Machinery and apparatus for filtering or purifying gases	Catalytic Converters
Weighing machinery of maximum weighing capacity >5.000kg	Sewage treatment equipment
Primary cells and primary batteries, electric	Fuel Cells
Paints and varnishes	Cleaner paints and varnishes
Electric industrial or laboratory furnaces and ovens	Incinerators
Articles of lead, n.e.s.	Lead products (often for waste storage)
Reservoirs, tanks, vats and similar containers, of iron or steel	Tanks for sewage treatment
AC generators "alternators", of an output <= 75 kVA	AC generator for renewable energy
Pumps for liquids, power-driven	Pumps for liquids
Parts of electric industrial or laboratory furnaces and ovens	Parts for incinerators

4. Scoping of green trade and industry opportunities: Trade analysis

Green Products – Export Rank	Export Rank
Catalytic Converters	1
Pumps for liquids	2
Tanks for sewage treatment	3
Fuel Cells	4
Cleaner paints and varnishes	5
Lead products (often for waste storage)	6
Parts for incinerators	7
Recycling Equipment	8
AC generator for renewable energy	9
Sewage treatment equipment	10
Biomass boilers	11
Incinerators	12

4. Scoping of green trade and industry opportunities: Trade analysis

Green Products – Export Growth	Growth	Export Rank
Biomass boilers	37.4%	11
Incinerators	27.8%	12
Parts for incinerators	14.9%	7
Cleaner paints and varnishes	12.0%	5
Recycling Equipment	11.0%	8
Tanks for sewage treatment	9.6%	3
Lead products (often for waste storage)	9.6%	6
Pumps for liquids	8.2%	2
AC generator for renewable energy	7.9%	9
Sewage treatment equipment	7.5%	10
Catalytic Converters	1.0%	1
Fuel Cells	-1.8%	4

4. Scoping of green trade and industry opportunities: Trade analysis

Green Products – Share of World Exports	World Share	Growth	Export Rank
Catalytic Converters	11.2%	1.0%	1
Lead products (often for waste storage)	3.8%	9.6%	6
Fuel Cells	2.8%	-1.8%	4
Sewage treatment equipment	2.6%	7.5%	10
Pumps for liquids	2.3%	8.2%	2
Recycling Equipment	1.6%	11.0%	8
Tanks for sewage treatment	0.9%	9.6%	3
Cleaner paints and varnishes	0.8%	12.0%	5
AC generator for renewable energy	0.8%	7.9%	9
Parts for incinerators	0.7%	14.9%	7
Incinerators	0.6%	27.8%	12
Biomass boilers	0.5%	37.4%	11

4. Scoping of green trade and industry opportunities: Trade analysis

Green Products – Revealed Comparative Advantage	RCA	Share	Growth	Rank
Catalytic Converters	17.3	11.2%	1.0%	1
Lead products (often for waste storage)	6.4	3.8%	9.6%	6
Fuel Cells	4.7	2.8%	-1.8%	4
Sewage treatment equipment	4.0	2.6%	7.5%	10
Pumps for liquids	3.9	2.3%	8.2%	2
Recycling Equipment	2.8	1.6%	11.0%	8
AC generator for renewable energy	1.5	0.8%	7.9%	9
Tanks for sewage treatment	1.4	0.9%	9.6%	3
Cleaner paints and varnishes	1.3	0.8%	12.0%	5
Parts for incinerators	1.2	0.7%	14.9%	7
Incinerators	1.0	0.6%	27.8%	12
Biomass boilers	0.8	0.5%	37.4%	11

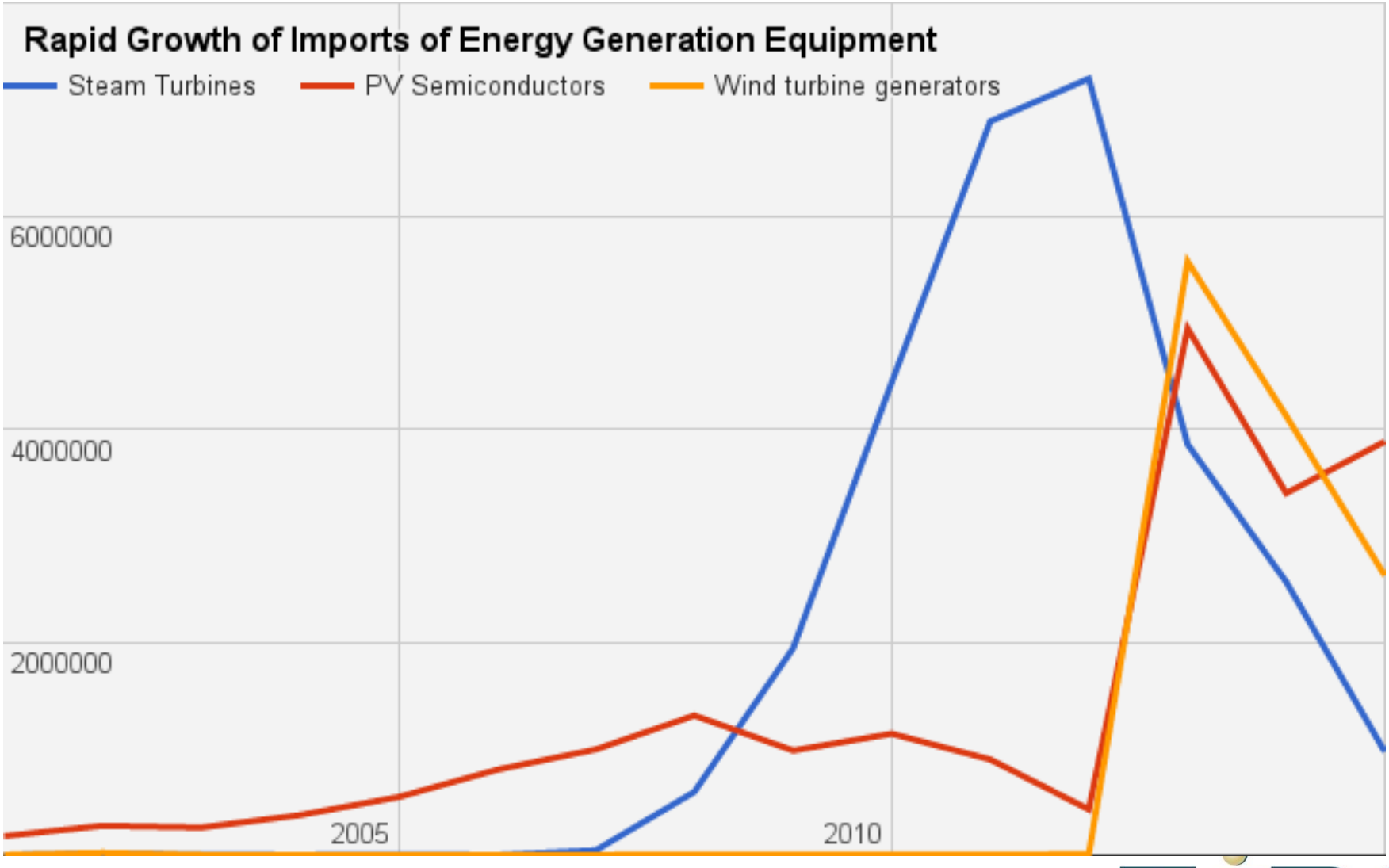
4. Scoping of green trade and industry opportunities: Trade analysis

Van Niekerk & Viviers	
Photosensitive/photovoltaic/ LED semiconductors	Generate electricity from solar power
Towers and lattice masts	Used to elevate the blades of wind turbines.
Electrical control and distribution boards, < 1kV	Controls the functioning of the photovoltaic system.
Gearing and screws	Convert slow rotation of blades of wind turbines to a sufficient speed to generate electricity
Static converters	Convert solar energy into electricity

4. Scoping of green trade and industry opportunities: Trade analysis

Top South African Green Imports	
Steam and other vapour turbines, of an output > 40 MW	Steam Turbines
Photosensitive semiconductor devices	PV Semiconductors
Appliances for pipes, boiler shells, tanks, vats or the like	Waste handling equipment
Machines and mechanical appliances, n.e.s.	Recycling Equipment
Generating sets, wind-powered	Wind turbine generators
Generating sets (excluding wind-powered and powered by spark-ignition internal combustion piston engine)	Wind turbine generator parts
Articles of plastics and articles of other materials of 3901 -3914, n.e.s	Wastewater Screens/strainers
Gears and gearing for machinery; ball or roller screws; gear boxes and other speed changers, incl. torque converters	Wind turbine gearing
Parts of steam and other vapour turbines, n.e.s.	Steam Turbine Parts
Parts of machinery and apparatus for filtering or purifying liquids or gases, n.e.s.	Filtration/Purification System Parts
Instruments, appliances and machines for measuring or checking	Monitoring/Regulating Equipment (Manostats)
Regulating or controlling instruments and apparatus	Monitoring/Regulating Equipment (Other)

4. Scoping of green trade and industry opportunities: Trade analysis



4. Scoping of green trade and industry opportunities : Trade analysis

- Stylised Results
  - Focus on components that leverage off pre-existing industries
    - Gearing, glass, basic electronics, etc.
  - Big ticket items not clearly viable yet
  - Regional markets not major driver yet (according to ITP analysis)
  - Bright spots: incinerators, biomass boilers (albeit from low base)
  - Only **major** export advantage is in catalytic convertors

- Results of Green Trade Analysis
  - Scale of trade still quite low (except for catalytic convertors)
  - Categories for 'green trade' cover a large number of products
  - **Can only get a rough picture**

Need to look beyond data

Scoping of green trade and industry opportunities: Stakeholders consultation

5. Scoping of green trade and industry opportunities: Stakeholders consultation

Select Interview Areas Identified

- The biogas-to-transport value chain
- The transition to renewable energy-based electricity
- Smart grid technologies
- PGM downstream opportunities
- Development of sustainable, composite materials
- Water-related technologies (metering and conservation)
- Water-related technologies (treatment, recycling and reuse)
- Smart agriculture technologies
- Development of energy efficient products
- Other waste management opportunities
- Other transportation opportunities

5. Scoping of green trade and industry opportunities: Stakeholders consultation

The transition to renewable energy-based electricity

- Substantial growth of renewable energy globally and in South Africa, **but** manufacturing led by China, US and EU
- Missed opportunities from the manufacturing perspective
  - Significant imports (REIPPPP)
  - Uncertainty driving existing manufacturers to close (SMA and DCD) or struggle (Jinko, Kestrel)

- **Still some opportunities**
  - Smart meters and monitoring systems
  - Battery and energy storage technologies (Solar Turtle concept, link to fuel cells and vandium-based batteries?)
  - Local innovations to be leveraged (ex: thin-film panel technology)

5. Scoping of green trade and industry opportunities: Stakeholders consultation

PGM downstream opportunities

- SA has a comparative advantage in PGMs
- **But** the main use of platinum – catalytic converters – is threatened (reduced platinum content, phasing out of combustion engines)
- Significant investment worldwide
  - Mining companies (PGM Development Fund) are heavily investing in the development of new technologies using PGMs (transportation, energy storage)
  - OEMs are investing massively too (ex: Toyota's Mirai coming in 2019)
  - SA Government is supporting multiple initiatives through DST (rural electrification, forklift pilot project, CoM and stationary fuel cell) and the dti (SEZ for the Platinum Belt)
  - Link to vanadium downstream opportunities (ex: Vanadium Redox Flow Battery and Bushveld Energy)
- The development of fuel cells and the potential for SA to manufacture them locally remain unclear at this stage

5. Scoping of green trade and industry opportunities: Stakeholders consultation

The biogas-to-transport value chain

- Significant ISI opportunity to replace petroleum with biogas
- Significant sources of feedstock, and experience from a growing number of sites in SA
- Potential to leverage a shift of government fleet to biogas, as well as BRTs and taxis
- Potential to attract gas equipment manufacturer (conversion kits, cylinders, refuelling stations, etc.)

Other transportation opportunities

- Rail Coaches, Bicycles, Electric Vehicles

Other waste management opportunities

- Industrial symbiosis, e-waste recycling, Waste-based products (plastics into diesel; plastics into tarmac)

5. Scoping of green trade and industry opportunities: Stakeholders consultation

Development of sustainable, composite materials

- Global rise in new, innovative and more sustainable materials in numerous industries, substiting chemicals with natural inputs
  - Biomaterials, including bioceramics, biopolymers/bioplastics and bio-metals, drug delivery systems, nano-enabled biomaterials, regenerative tissue engineering, stem cells, medical devices, biomechanics
- SA has a number of pioneers in the field

Development of energy efficient products

- Importance of connection to Greening processes
- Manufacturing of energy efficient conveyer belts, SWHs, LED, Glass (e.g. Consol), Clean Stoves

5. Scoping of green trade and industry opportunities: Stakeholders consultation

Water-related technologies

SA is water-stressed and faces ongoing water-related challenges

- Aging and lacking infrastructure, lack of access, drought and sea-level rise vulnerability, inadeqaute policy framework, etc.)
- Increased focus on water management (War on Leaks campaign)

- **Metering and Conservation**: Metering systems and smart water meters, Conservation technologies (leak protection, leak detection, leak solution), Water-efficient products (toilets, etc.)
- **Treatment, recycling and reuse**: Water treatment (decentralised wastewater treatment, water pumps), Water membranes and filtration systems, desalination technologies. AMD technologies?
- **Smart agriculture technologies**: Precision/conservation agriculture (GIS-based), drip irrigation, control systems and water distribution monitoring (digital water management, e.g. through smart phones)

Conclusion

6. Conclusion

Export Data

Import Substitution

High Trade-Potential Sectors

1. The biogas-to-transport value chain
2. Small-scale renewable energy (incl. storage) and smart grids
3. PGM downstream opportunities
4. Sustainable, composite materials
5. Water-related technologies (metering and conservation)
6. Water-related technologies (treatment, reuse and recycling)

Policy Priorities

Expert Interviews

6. Conclusion

Way forward

- Wrapping up of Phase 1 (by end 2016)
  - Incorporation of feedback from workshop
  - Selection of up to five opportunities to deepen the analysis

- Phase 2: Investigation into selected opportunities (by mid 2017)
  - Policy analysis
  - Industry and trade data analysis
  - Stakeholder consultation

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