



BIO-ENERGY CLUSTER COMMITTEE WORKSHOP



Industrial Development Corporation

Your partner in development finance

Funding and bio-energy projects in SA

Towards a green future ...

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Green Industry SBU

Industrial Development Corporation

20 February 2013

The Industrial Development Corporation

- **Established:** 1940 **Ownership:** South African Government
- **Type of organisation:** Development Finance Institution (DFI)
- **Total assets:** R 112 billion (US\$13 billion*) as at March 2012
- **Funding status:** Self financing, pays dividends and income tax
- **Credit rating:** Baa1 (Moody's) in line with sovereign rating
- **Main business area:** Providing funding for entrepreneurs and projects that are contributing to industrialisation and job creation
- **Geographic activities:** South Africa and the rest of Africa
- **Products:** Wide range of custom financial products to suit a project's needs including debt, equity, guarantees or a mixture of these
- **Stage of investment:** Early stage (feasibility), commercialisation, expansion
- **Project development:** Identification and development of projects adding to the industrial base
- **Number of employees:** 770

Partnering for industrial development

IDC

- 70 years of experience in industrial development
- Appetite to take risk
- Early stage investment
- Financial muscle
- Targeted funding for specific interventions

Industrialists/ Entrepreneurs

- Investment plans
- Projects under development
- Technology
- Operating/management expertise

Long-term view on investments and a commitment for the development of the industry

Positioning of DFIs within the financial system

Greater importance on social and developmental objectives

Greater importance on financial objectives

Government / NGOs

- Non-commercial focus
- Fiscal transfers and grants
- Development objectives (social)

DFIs (e.g. IDC)

- Commercial and development focus
- Sharing risk
- Internally generated funds, government funds, loans

Commercial Financiers

- High commercial focus
- Private sector capital
- Financial objectives
- Known risks

DFIs should not compete with other institutions, but should instead encourage cooperation to achieve its goals

Introducing IDC

Vision, mission, objective and values

Vision

To be “the primary driving force of commercially sustainable industrial development and innovation to the benefit of South Africa and the rest of the African continent”

Mission

The IDC is self-financing national development finance institution whose primary objectives are to contribute to the generation of balanced, sustainable economic growth in Africa and to the economic empowerment of the South African population, thereby promoting the economic prosperity of all citizens. The IDC achieves this by promoting entrepreneurship through the building of competitive industries and enterprises based on sound business principles.

Objective

Support industrial capacity development

Outcomes

- Facilitate sustainable direct and indirect employment
- Regional equity (including development of the rest of Africa)
- Growing the entrepreneur and SME sector
- Expansionary and/or broad-based black economic empowerment
- Environmentally sustainable growth
- Grow sectoral diversity and increase localisation

Values

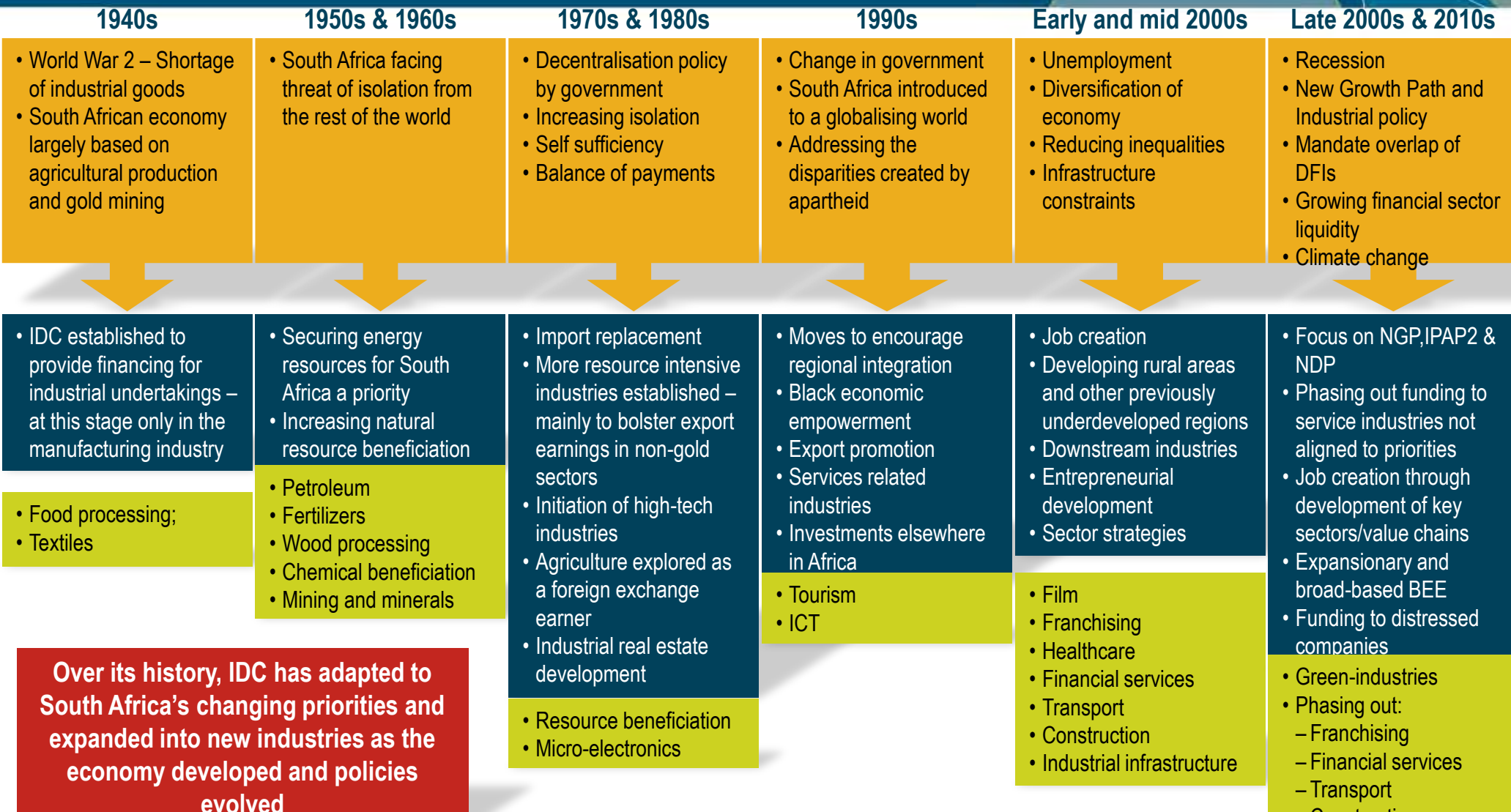
Passion

Professionalism

Partnership

Introducing IDC

Historical perspective



Over its history, IDC has adapted to South Africa's changing priorities and expanded into new industries as the economy developed and policies evolved

SA's industrial policy: sector focus

Industrial Policy Action Plan (IPAP)

Focus sectors of IPAP considering their potential to contribute to growth, employment & equity:



Green industries:

- Development of local wind and solar industry via REPP procurement, incl. components manufacturing
- Domestic production of solar water heaters.



Forestry, timber, paper & pulp, furniture:

- Accelerate forestry development and improve productivity of sawmills
- Improve competitiveness of domestic & office furniture sector
- Packaging, paper recycling etc.

SA's New Growth Path: sector focus

New Growth Path

SA's national strategy to enhance economic growth, development, employment creation and equity prioritises:



Agriculture value chain development, including smallholder and commercial farming, aquaculture and agro-processing



Further exploitation of mineral reserves, more advanced downstream beneficiation (beyond refining and smelting)



Expand tourism offer, including infrastructure and associated support industries and services



'Green' economy: renewable energies, energy efficiency, cleaner energy, emissions control, natural resource management



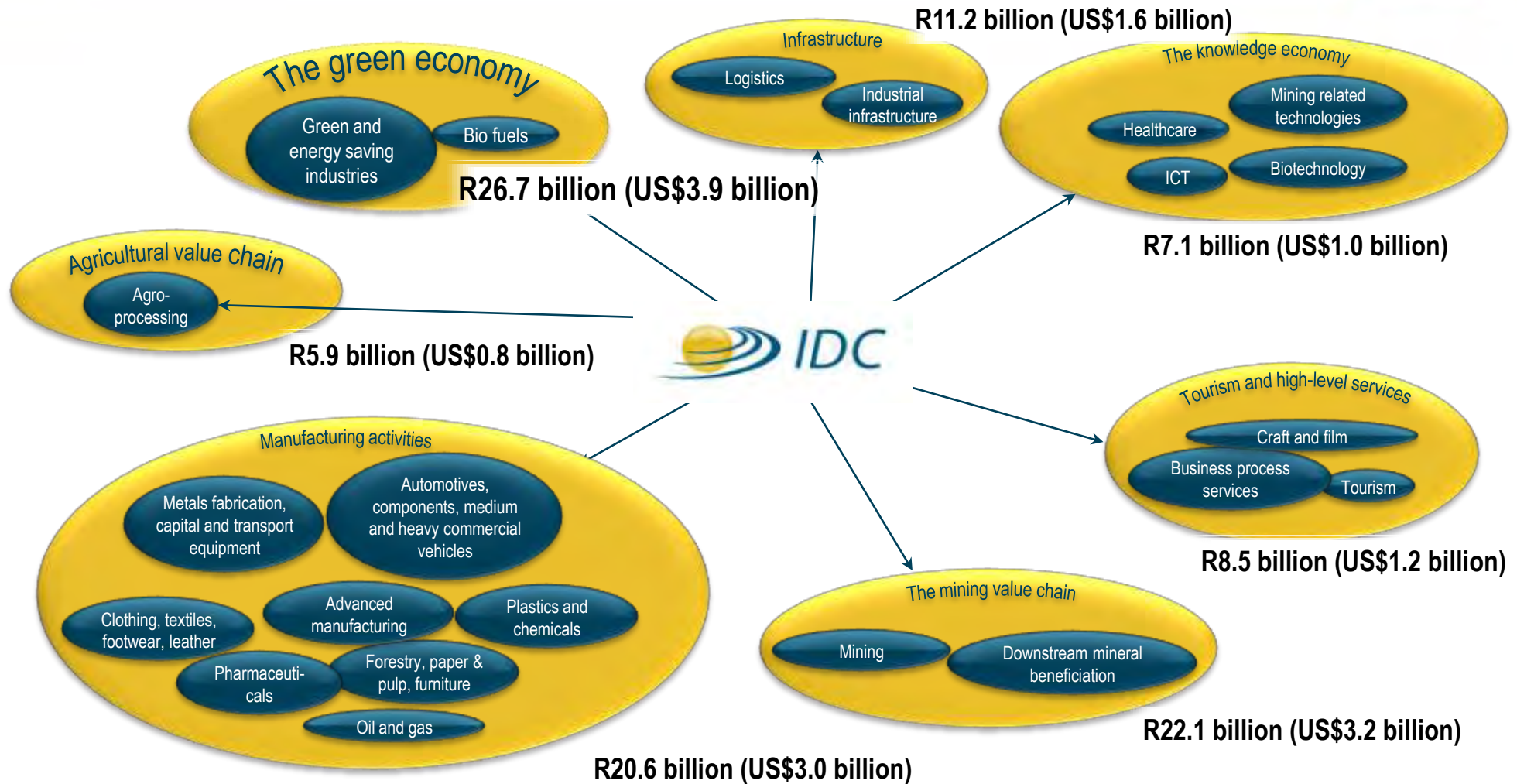
Knowledge-intensive industries: ICT, mining related technologies, biotechnology, healthcare etc.



Manufacturing sectors prioritised by the Industrial Policy Action Plan (IPAP), aimed at growing and diversifying SA's industrial base

IDC has aligned its sectoral focus areas with government's priorities

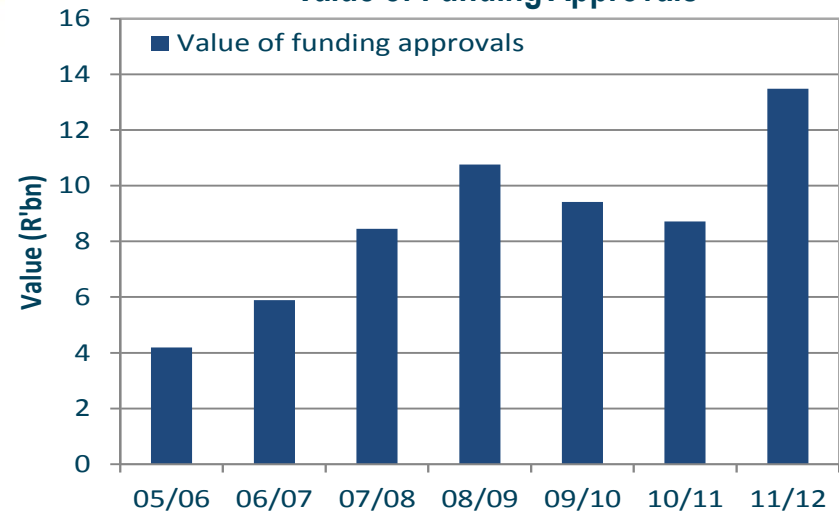
Target investment 2012-2016



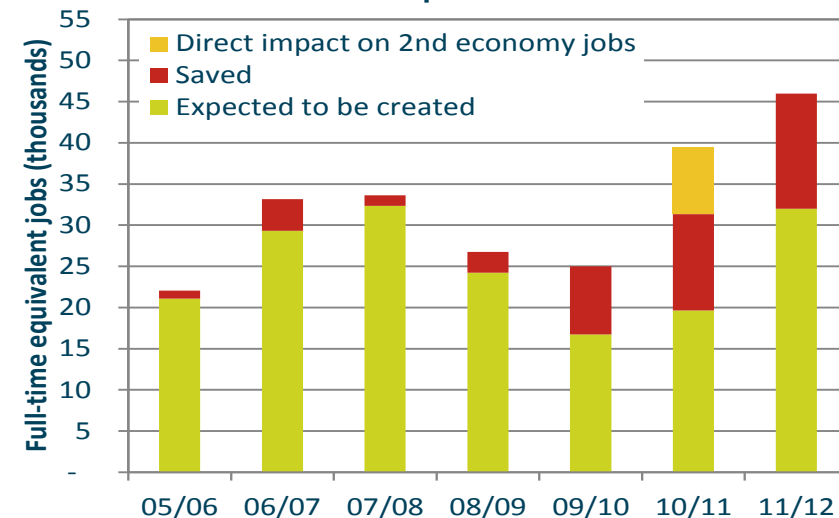
Highlights of FY 2011/12

- **Record levels of funding activity:**
 - 55% increase in the value of funding approved to ZAR13.5 billion (USD1.6 billion) in FY 2011/12.
 - Reaching more businesses, with a 33% increase in the number of funding approvals to 293 funding approvals in FY 2011/12.
- **Increasing impact on employment:**
 - 45 900 jobs expected to be created and saved in South Africa compared to 39 400 in 2010/11.
 - 48% of these expected jobs will be in rural areas.
- **Financial sustainability underpinned by profits of ZAR3.3 billion (USD382 million) – i.e. a 22% increase from previous financial year.**

Value of Funding Approvals

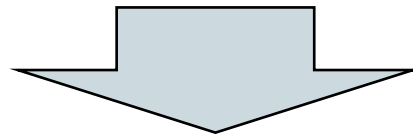


Impact on Jobs



Green industries and technologies: *Context*

- SA GHG emissions
 - one of the higher producers of carbon equivalents per capita and per GDP (higher than USA)
 - Lagging behind in carbon credits generation, ie RE & EE – lost opportunities of CDM
 - Leadership role in Copenhagen COP 15 and COP 17 in Durban in Dec 2011
 - Energy has been used wastefully in past – low cost electricity, low cost coal
- Potential - Good sun, some areas of good wind, limited hydro, waste not utilised
- Single electricity utility and multinational oil companies – opportunity and constraint
- Need implementation – new industries opportunity for SA - **focus sector in NGP**
- SA developing country – green technologies expensive (upfront capital mainly)
- Local production opportunities if SA/Africa become significant buyers



Opportunity and role for IDC , so...

Green Industries SBU: Established April 2011- Clusters

Renewable Energy: Non-Fuel Power

Wind Power
Generation

Concentrated Solar
Power

Solar Photo Voltaic
Power

Energy efficiency

Heat,
Electricity &
building
efficiency

Cleaner
production /
Industrial
Efficiency

Transport
Efficiency

Services related to
renewable energy
& energy
efficiency

Local
manufacturing
related to
renewable energy
& energy
efficiency

Fuel Based Energy

Biomass

Waste to Energy

Co-generation

Combined Heat Power

Biogas

Hydro



Bio Fuels

Bio Ethanol

Bio Diesel

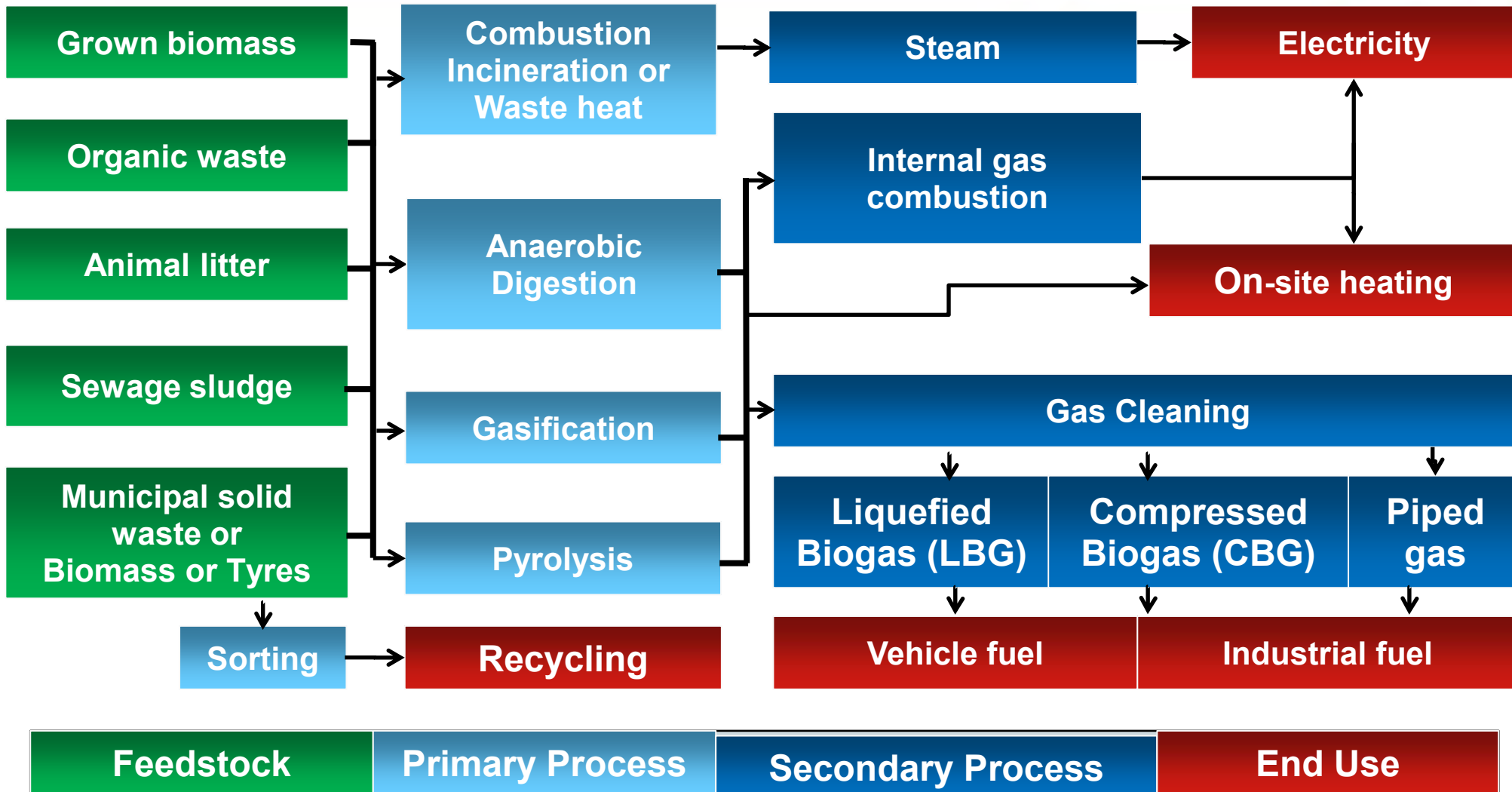
Emission and pollution mitigation

Air pollution control

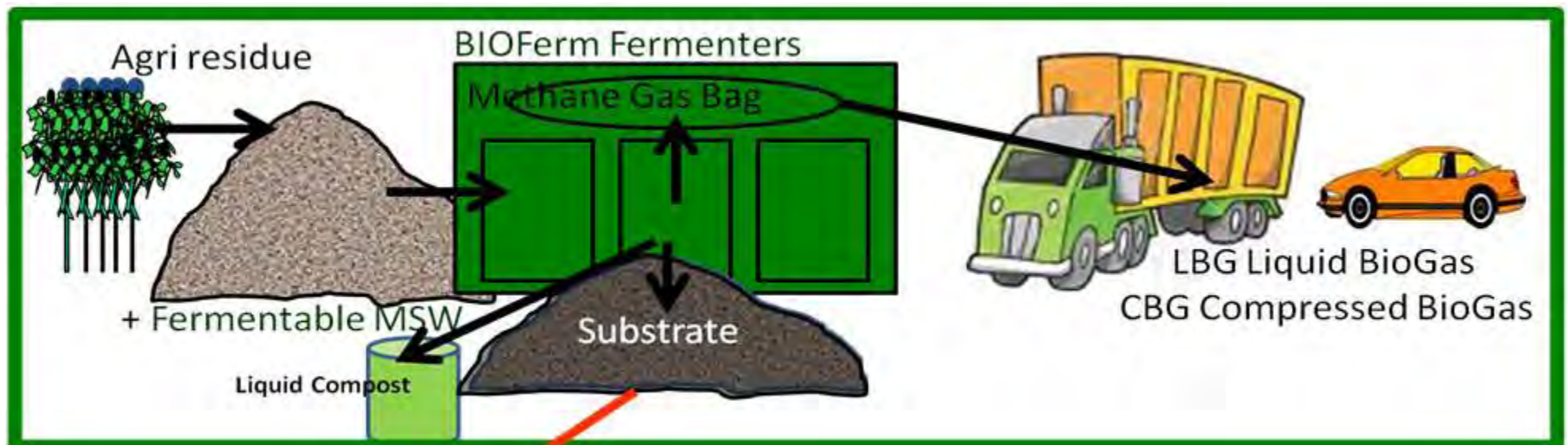
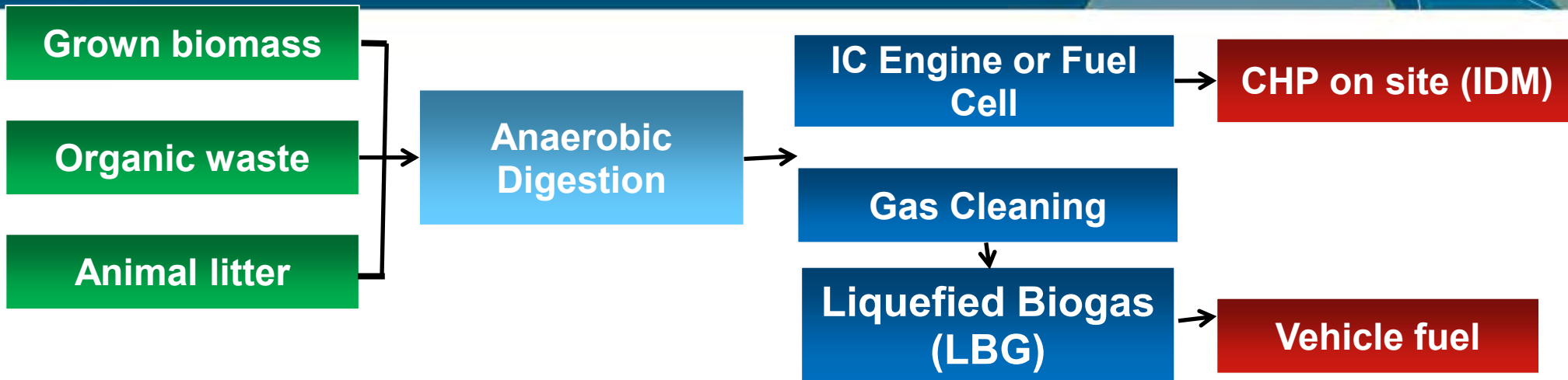
Waste
Management/
Recycling

Clean stoves

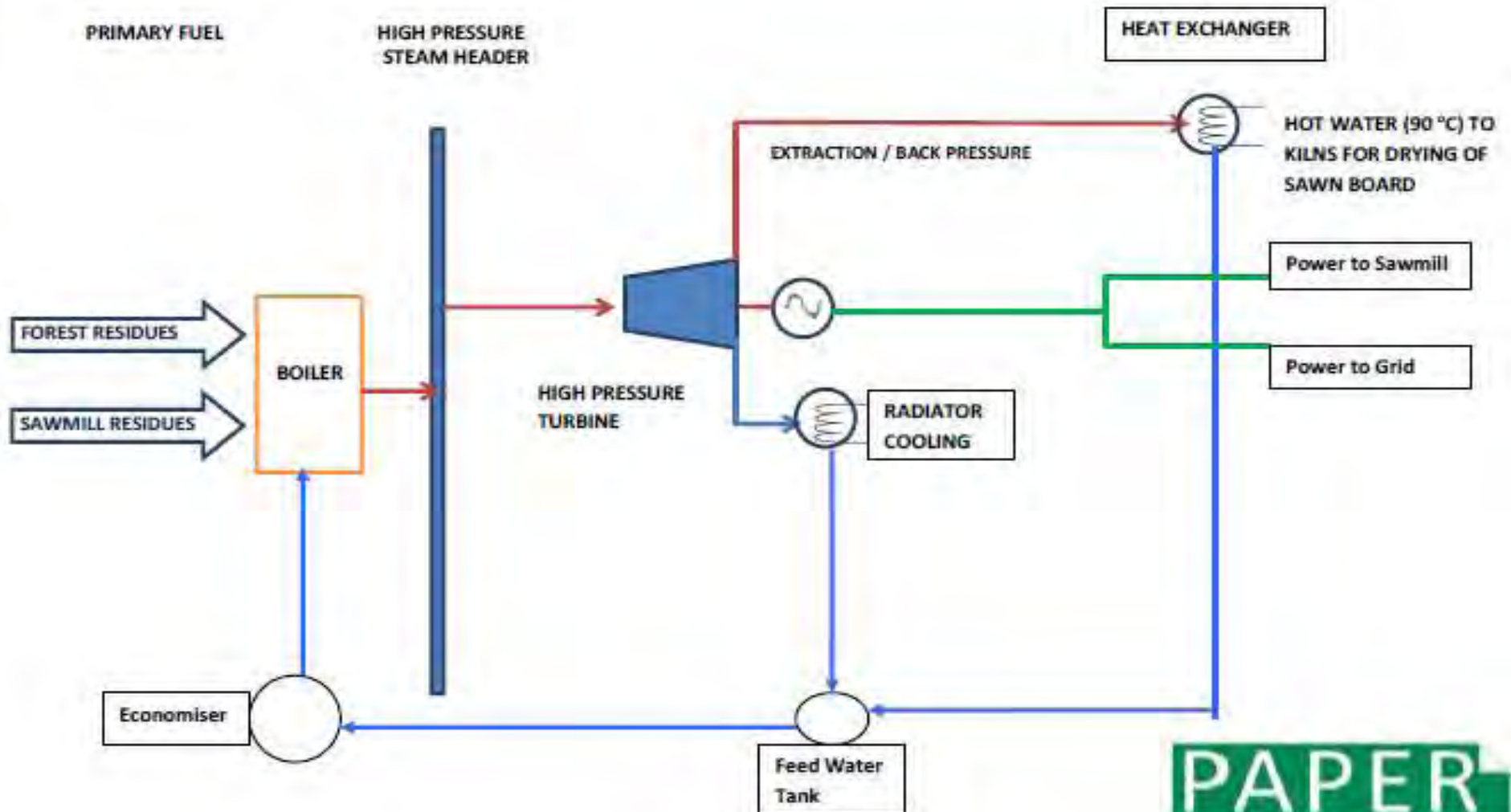
Renewable energy: Fuel based power: Waste /Biomass



Renewable energy – Realistic Agricultural Options

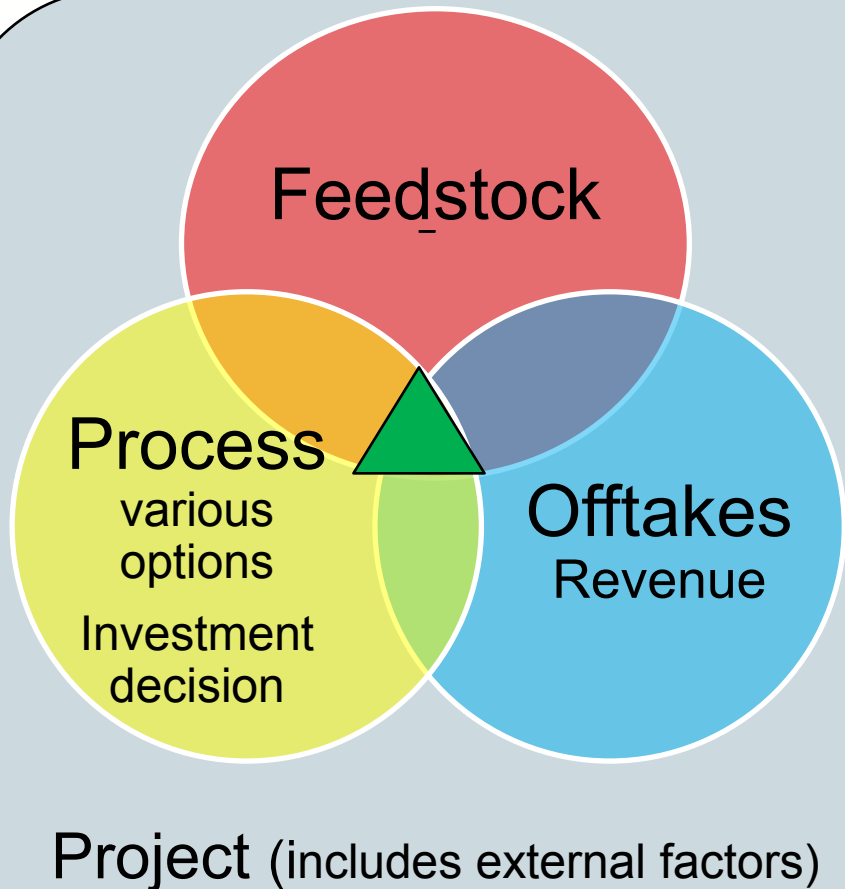


CHP at a Sawmill



Fuel Based Green Energy

Biomass, Waste to energy and Co-generation



To achieve **TARGET ZONE:** 

1. **FEEDSTOCK (FUEL) SECURITY!**

- No Feedstock security, no start!
- Feedstock security means quantity, quality, price, period!

2. **PROCESS/INVESTMENT options**

- largely driven by FEEDSTOCK QUALITIES, QUANTITIES, TERM and OFFTAKE OPTIONS
- Typical R 15-35 mil per MW
- High load factors eg 90 % (base load), or peaking for gas, hydro

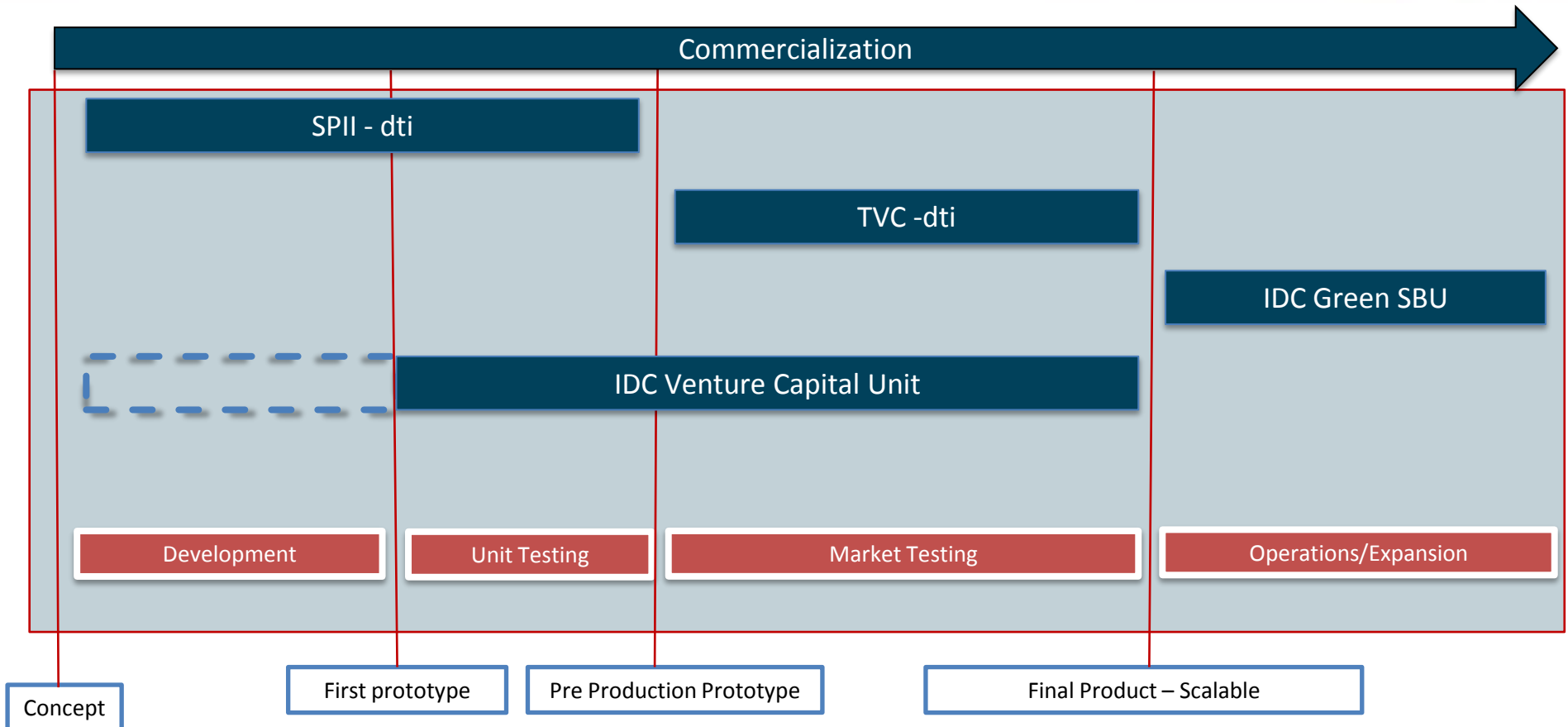
3. **High RATIO of OFFTAKE:FEEDSTOCK prices**

- Low O&M, so capital can be repaid if Scale sufficient & Offtake/Feedstock price ratio strong

Introducing Green Industries SBU

How we operate ...

Product development life-cycle



Introducing GREEN SBU

How we operate ...

Funding instruments ...

- Debt - across spectrum
- Quasi-equity
- Equity
- Working capital
- Revolving facilities
- Guarantees
- Export finance

Lending principles ...

- Project finance
- Corporate finance
- Project development

Project Development Approach

Example....

Project (business) development phases



Pre-scoping stage

- Fit IDC mandate
- Fit ICT mandate
- Potentially viable

Scoping stage

- Desktop financial model and report
- Outline scope of work to implementation stage
- Request project development budget – used to carry out subsequent stages

Pre feasibility study

- Technology checks
- Operating partner
- Regulations (e.g. Carbon credits)
- SA plant location
- Raw material security (e.g. Refrigerator supply vs. breakeven volumes)
- Financial model

Approximately 2% of project cost

Feasibility study

- Pilot Study
- Financial model

Approximately 5-10% of project cost

Implementation

- Plant commission and operation

Global warming : use of fossil fuels for electricity generation & transport energy related to population & “development”

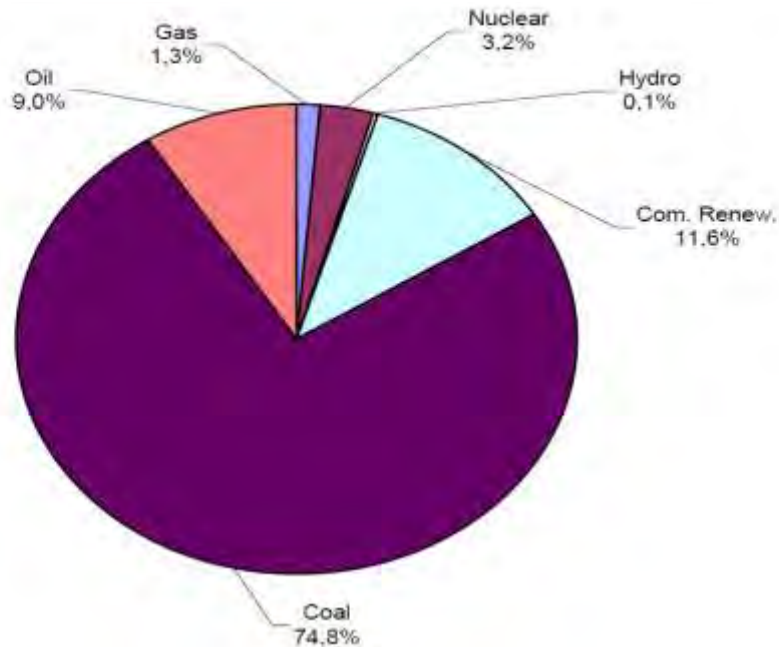
USA (3 % of world population) has used 50 % of world petrol

SA population with USA level income uses MORE petrol than same American –cost?

FACT: USA lifestyle is NOT sustainable (nor affordable) for planet

Context : Oil is very expensive compared to Electricity (Coal) and far less SA jobs

Primary Energy supply (%) in SA



Energy usage in SA: GJ & Rands

SA Usage pa	Electricity (95 % ex Coal)	Natural Gas* (methane)	Liquid fuels (diesel, petrol, Jet/IP)
Mil GJ	800	60	880
R billion**	100	8	200

* Gas ex Mozambique

** Excl taxes, levies, ex works

- **OIL cost of energy is 10x COAL for SA (same energy basis), 3x electricity**
- **OIL is imported with massive Forex cost**
- **COAL (for electricity) 300x more job intensive for same spend as oil**

South Africa energy challenge 1

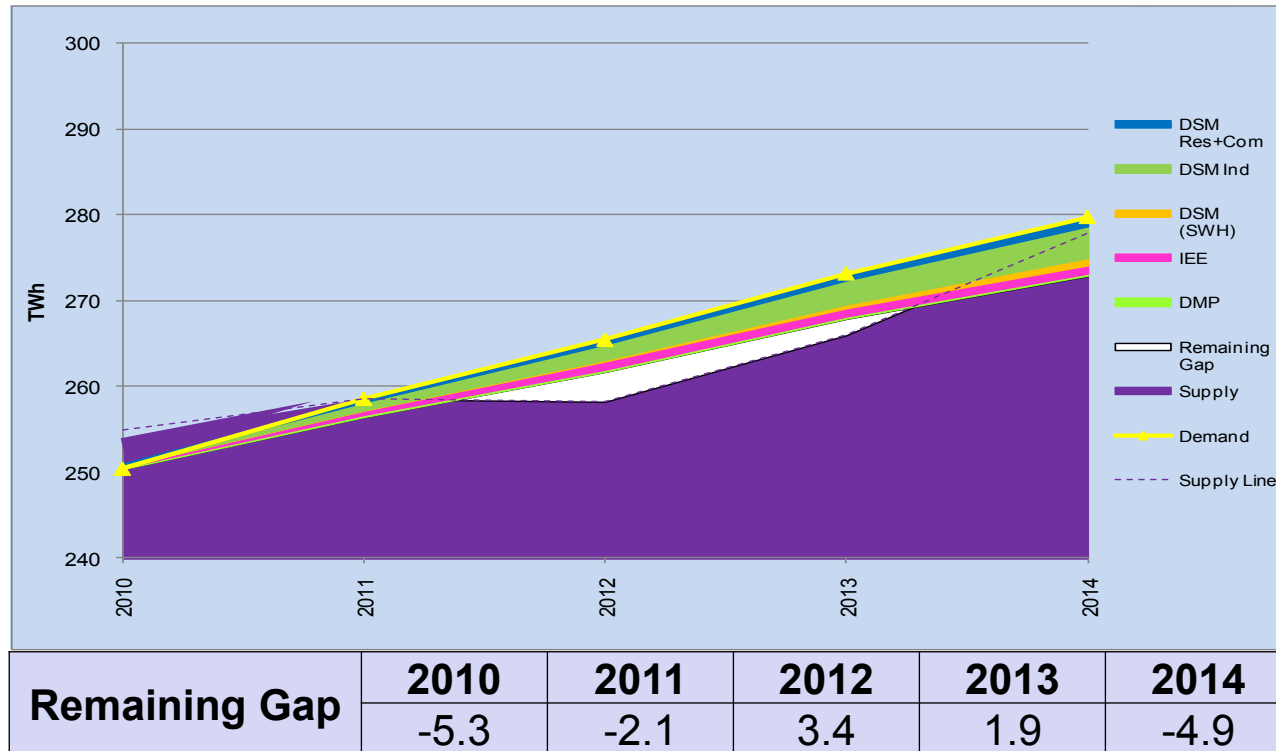
- **SA energy consumption: ca 6000 PJ (10^{15}) (1660 Twhpa): 1.1 % of global, but 3.5 % of GHG emissions**
- **Crude oil and refined products (from this) is 20 % of SA energy, but by value R 150 bil (excl tax, distribution, marketing) - all spent on imports (at margin) with few jobs (1000's)**
 - Ca 600,000 bbl per day = 35 mil M3pa (30 mil tpa) = 6 bbl/second
 - Mainly by LSM 1 and 2 – implications for economic "growth"
- **Coal consumption : 70 % of SA energy, but by value is ca R 50 bil - all spent locally with many jobs (100,000)**
 - Ca 200 mil tpa (ca 100 mil toe pa) = 4200 PJ pa = 1160 TWh pa
 - Electricity : 900 PJ pa = 250 TWh pa (ca R 100 bil delivered, R 50 bil ex Generation)

COST of Oil to SA :

versus Electricity (Coal) = 3x (10x) for same energy

Oil imports = total exports of gold+ diamond+ coal

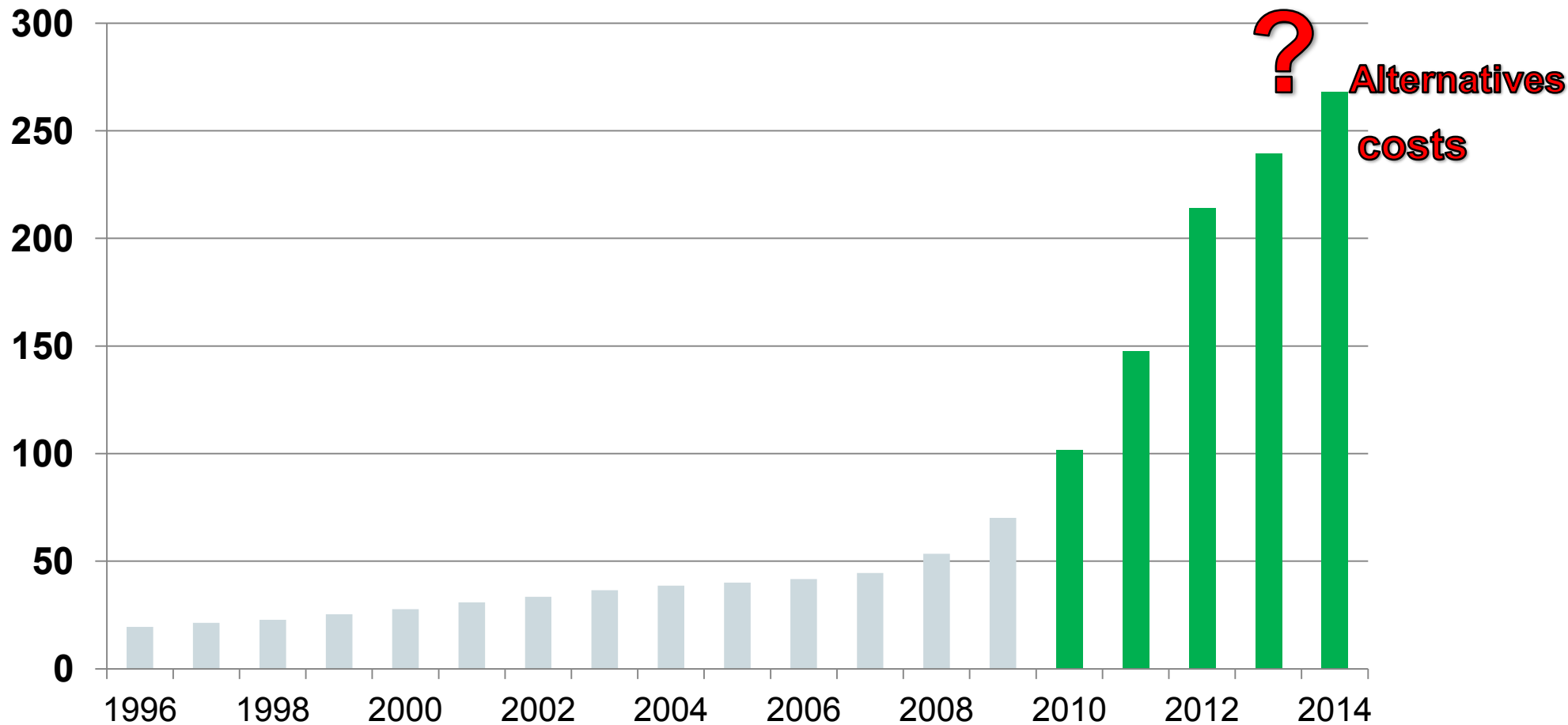
Context: SA Electricity Shortage: IDM today



By 2013: 2000 MW ISM needed– R5.4 bil allocated to Eskom
 Own use: R 5.25 mil/MW grant or R 10 mil for RE (1MW)
 Short term opportunity, or ongoing?

Context: SA Electricity Prices

Eskom Residential prices in cents per kwh.



Biomass Potential from SA Commercial Timber

Species	Sawlogs	Poles	Mining Timber	Pulpwood	Totals
Sales from Plantations	m3	m3	tons	tons	MW
Softwoods	4,145,537	-	-	3,421,600	
Hardwoods	229,262	456,663	430,788	6,974,780	
Power Generation Potential MW					
Softwoods	195.6	-	-	80.7	276.3
Hardwoods	13.5	18.8	16.9	193.7	242.9
Total	209.1	18.8	16.9	274.4	519.2

REFERENCES

1. "Report on Commercial Timber Resources and Primary Roundwood Processing in South Africa, 2008/2009"
(Compiled on behalf of the Directorate: Forestry Technical and Information Services, Department of Agriculture, Forestry and Fisheries, Forestry Branch, SA Government.)
1. "The Handbook of Biomass Combustion & Co-firing", Sjaak van Loo and Jaap Koppejan, Earthscan Publishing, 2008.
2. Private communications with Sappi, Mondi and SSA.

Biomass : Electricity Potential

Description	MW	Comment
Sawmills	300	CHP
PAMSA (Paper Manufacturing)	180	Fibre before fuel
Sugar Industry	1000	Co-feed tops & trash

Price indications (May 2011) range :

95 c/kWh	black liquor
134-151 c/kWh	wood chips, waste
150- 181 c/kWh	bagasse

Province	Project MW
Gauteng	11
Western Cape	20
Mpumalanga	86
Kwa-Zulu Natal	201
Swaziland	10

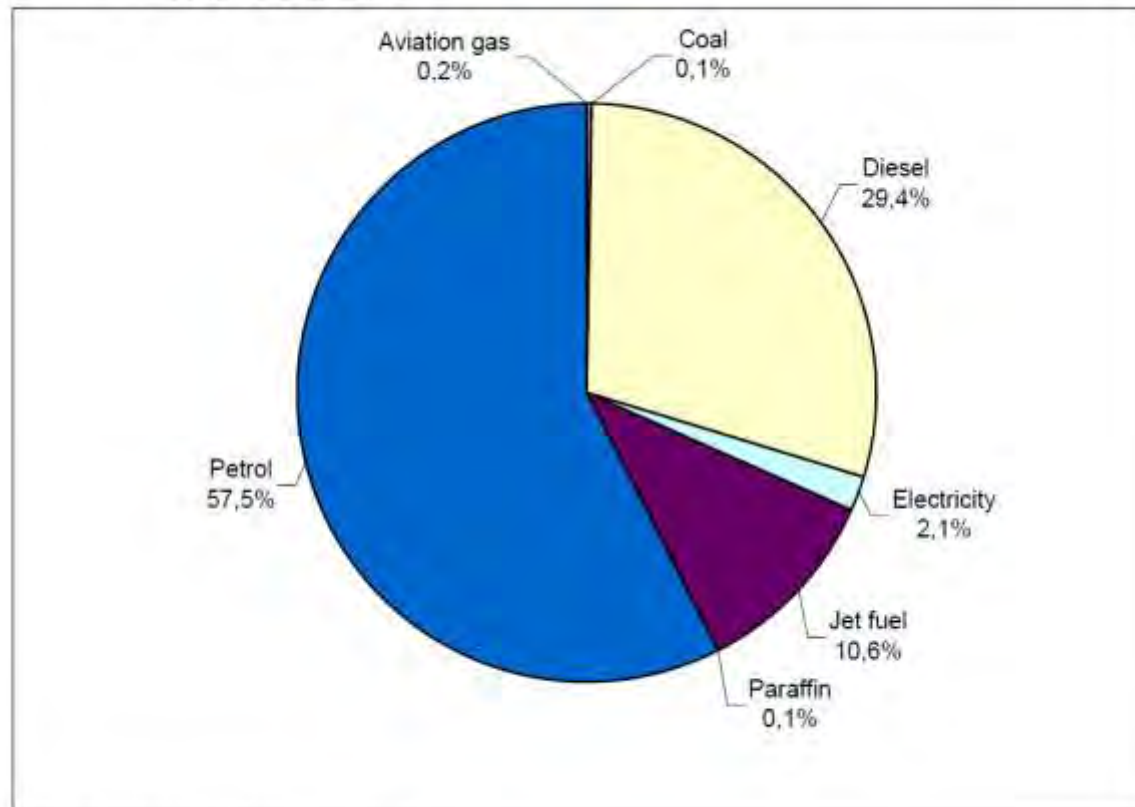
Context : Electricity in SA still cheap (ex coal)

	Coal	Natural Gas (methane)	Diesel (liquid fuels)
R/ton	200	2500	7000+
GJ/ton	20	50	44
R/GJ	10	50-100	150-200
c/ liter (diesel equiv)	—	180-360	550
c/kWh elec	10	45+	150+

- Coal local new mine – local jobs
- Low cost of electricity (based on cheap coal) – makes green elec less viable in ST
- Transport market is attractive – pricing and local jobs benefits
- SA should not use Gas or diesel for electricity generation
- If have engine/turbine already, then run on gas (cleaner, cheaper) rather than diesel
- Biogas should go to liquid fuel applications (transport) not electricity generation, unless own use/CHP

Context : SA Transport Energy: Expensive, Imported

Figure 11: Percentage distribution of energy types used in the transport sector in South Africa, 2000



Source: *Energy Outlook for South Africa: 2002*

Highest petrol use in world, same as USA

Used by high income population : 5.5 mil cars, yet 52 mil people
Some cars owners have 2 or 3....

Transport Jobs from Gas (methane) Sources

Gas System	Jobs/R million Capex *	Jobs/million litres diesel eq.	Jobs versus crude refining	Jobs per 10 % national fuel volumes
Biogas from Waste	0.27	16.8	25x	28 500 – 50 000
Biogas from Crops	1.9	114	200x	194 500 - 500 000
Landfill Gas	0.41	12.1	20x	20 500 -32 000
CNG Only	0.97	8.2	14x	14 000

* Includes vehicle conversions distribution & filling station capex

Support for Green Energy in South Africa

	c/kWh ¹	R/GJ	R/litre _{petrol eq.}	Comments
<u>ELECTRICITY USAGE</u>				Locally produced
<i>Wind</i>	50	140	4.40	Unreliable, low jobs
<i>PV/CSP</i>	200	560	17.6	Day time, low jobs
<i>Biomass</i>	56	157	4.93	Reliable
<i>Land fill gas</i>	42	116	3.70	Flexible (can peak)
<i>Biogas</i>	30	84	2.64	Jobs, flexible (can peak)
<u>LIQUID/TRANSPORT FUELS</u>				Imported at margin
<i>Biogas</i>	?	?	?	Jobs – high for crops
<i>Bio- ethanol/diesel²</i>	28	77	2.50	High jobs (ca R20kpa/job)

1. REIPP tender less Eskom cost of generation (base load 50 c/kWh); Eskom peaking is 5x!
2. In development (indicative) and Fuel tax issues eg. none now for LPG, CNG

Gas Vehicles in ST: SA Benefits

- Vehicle technology exists
- NG for CNG back-up readily available in Gauteng , parts of Mpumalanga & KZN

So, we can create jobs AND go green by replacing imported fuels like diesel, petrol

- Balance of Payment benefits
- Local tax base grows from employment
- Substantially lower emissions and associated public health cost savings
- Waste management solutions & fertiliser as co-product
 - Landfills
 - Sewage works
 - Manure/ agriculture
- Local jobs
 - Biogas through crop raising
 - Rural communities

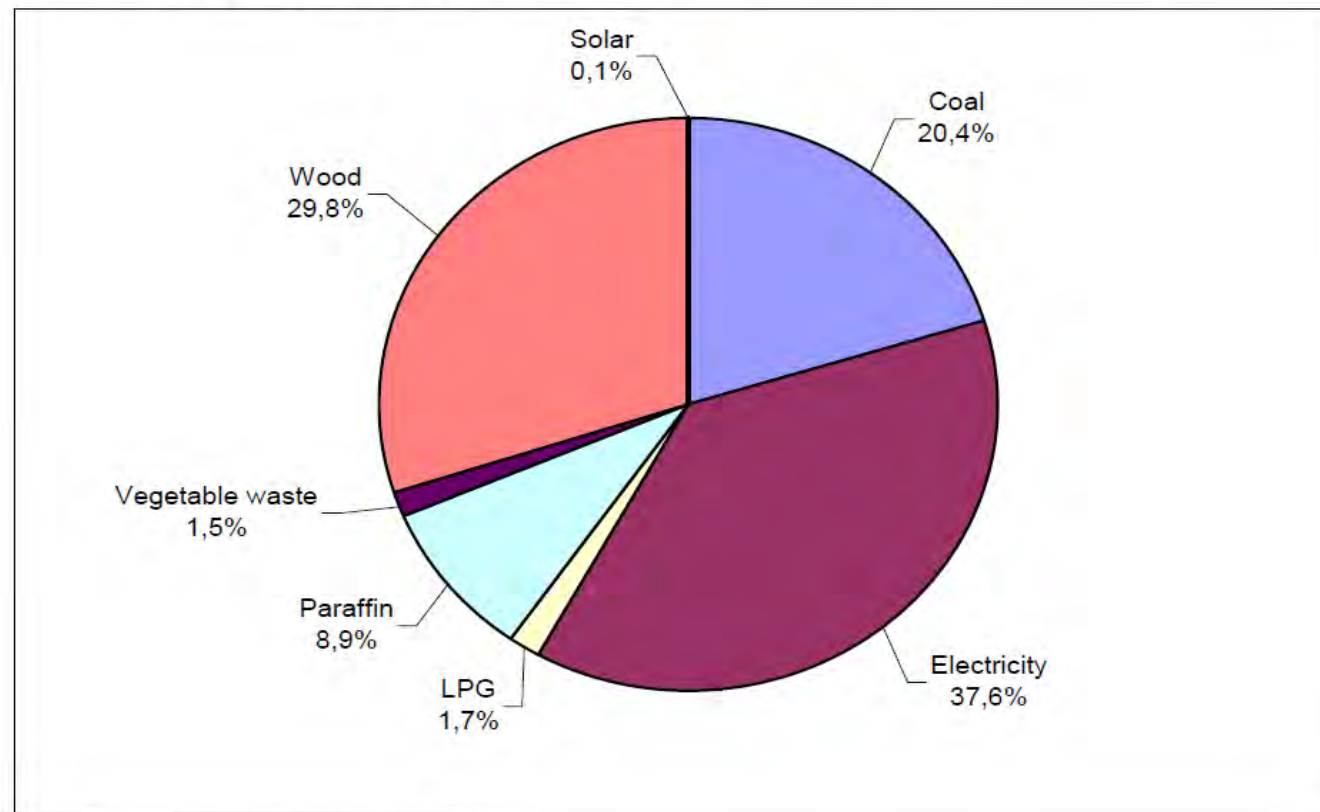
IDC position on Green Transport Fuels (ST)

- 1. IDC promotes the introduction of biogas and CNG driven Taxis and Buses for public transport**
 - *significantly reduce harmful emissions*
 - *assist with the development of a green fuels industry*
 - *import substitution of oil and fuel imports*
 - *contribute to local economic development and sustainable job creation*
- 2. IDC foresees projects to supply biogas/ CNG to operators**
- 3. IDC will fund and develop private biogas producers at the back end**
- 4. IDC will fund any associated infrastructure development projects**
- 5. Recovers the capital outlay in the gas supply margin**

In this process continual evaluation and addressing constraints....

Context: SA Household Energy: Diverse (Two Nations)

Figure 7: Percentage distribution of energy types used in the residential sector in South Africa, 2000

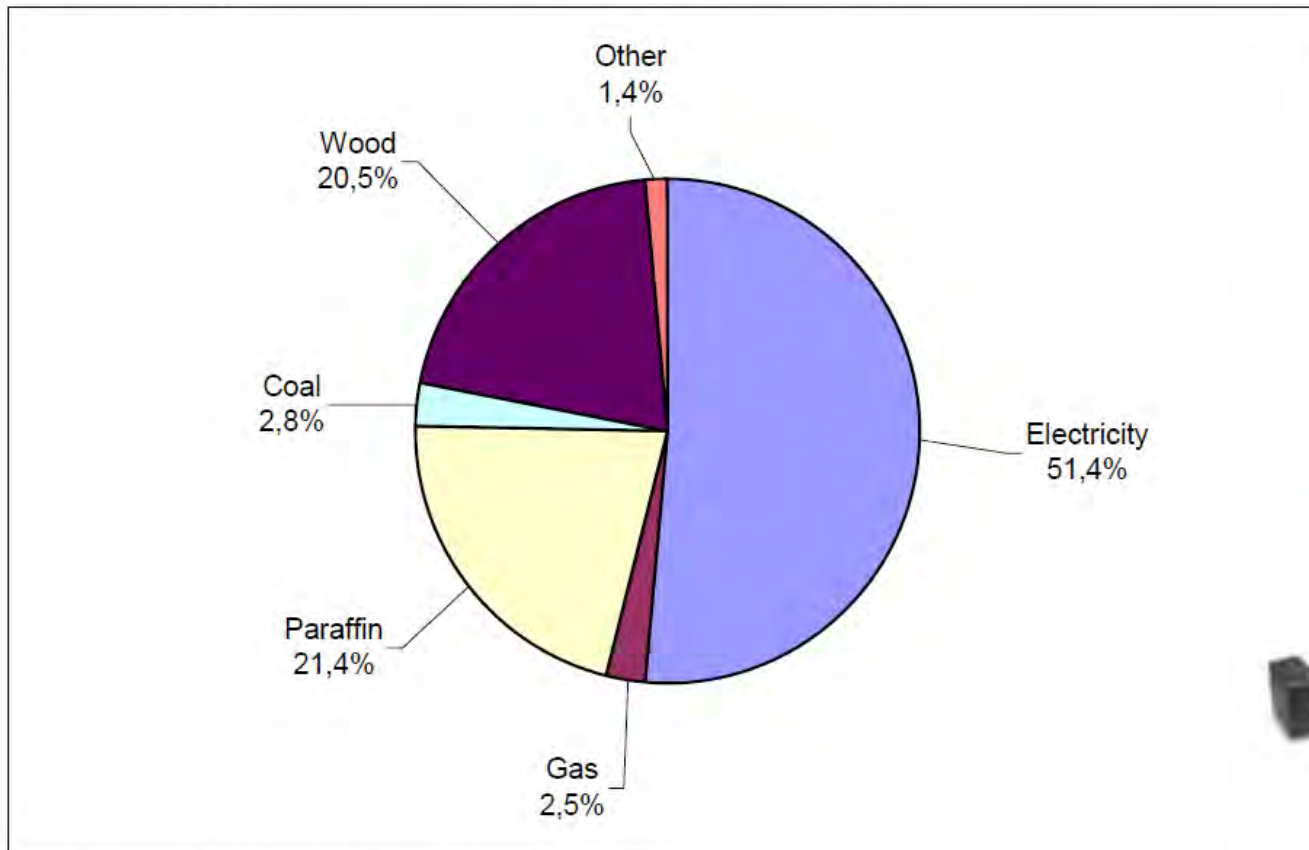


Source: *Energy Outlook for South Africa: 2002*

How can we change? Economic Growth, Jobs

SA uses Wood and Coal inefficiently for cooking

Figure 8: Distribution of households by main energy source used for cooking, 2001



Source: *Statistics South Africa: Census 2001*

IDC assisting clean, efficient stove interventions to lead to local manufacture



Biomass utilization in Energy in SA – views unchanged from 2010

- **Woodchip/pellet exports to EU have failed or battling**
 - **Low cost of competing coal makes SA a follower, so expect limited investments in next few years (unless robust CoBid process)**
 - **Initial project likely to be with:**
 - “waste” or co-products as feedstock (HOW TO GUARANTEE FOR FUNDERS?)
 - owner/host linked to offtake or neighbours
 - combined heat and power
 - co-feed biomass into existing assets (eg. sugar mills) or new assets to get scale and utilization
 - **Transport fuel market is technologically challenging, but more attractive in SA**
 - Biomethane as CNG/CMG
 - Fuel Cells (can also replace off-grid diesel gensets)
 - **Resource prices lifting, so longer term greater adoption**
 - Prices for energy rising (but can fluctuate widely)
 - International utilization of biomass for energy (with subsidies generally)
- IDC views its role as development funder important for next five years:**
- Long term view with equity and longer term debt

www.idc.co.za/greeneconomy

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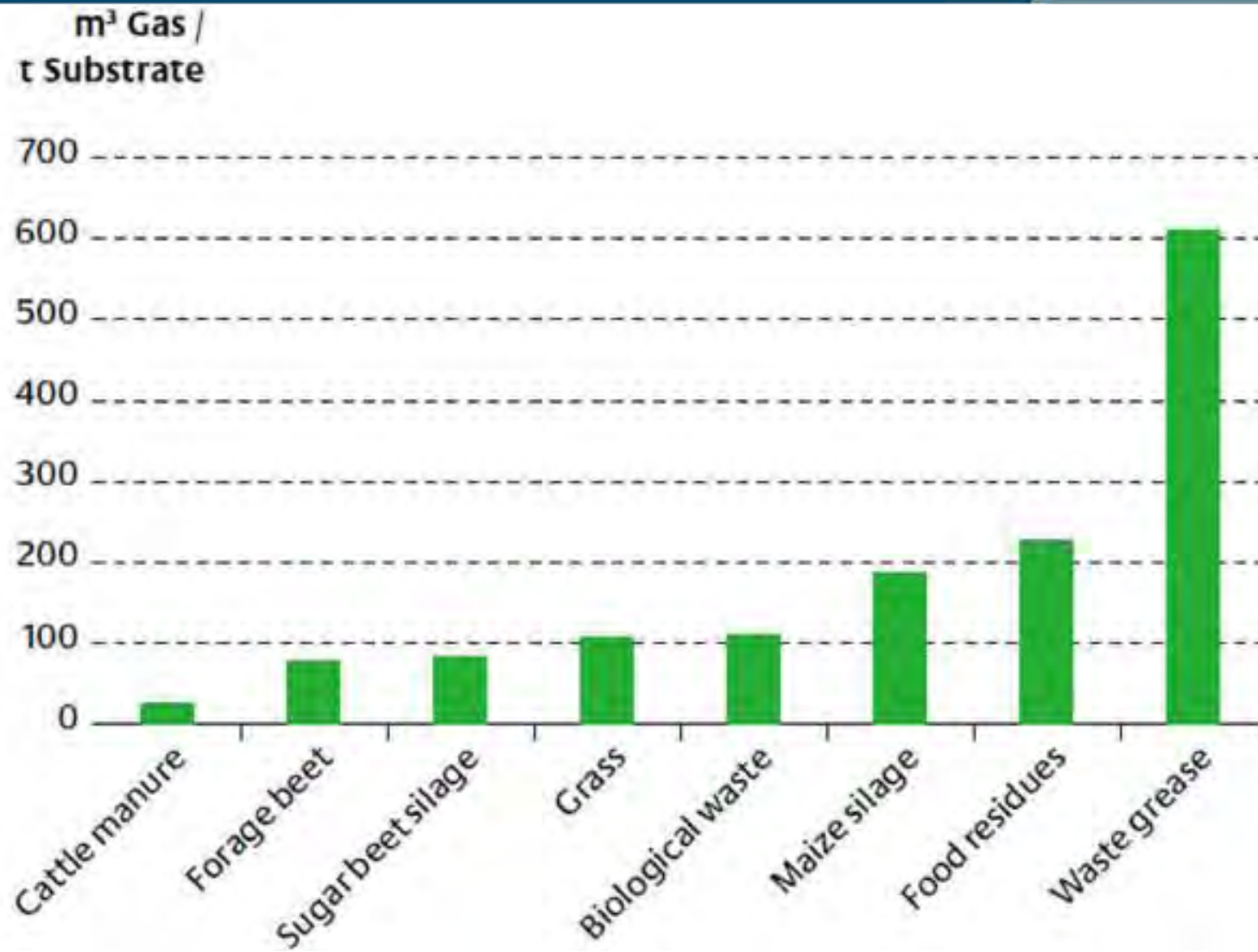
Your partner in development finance

Thank you



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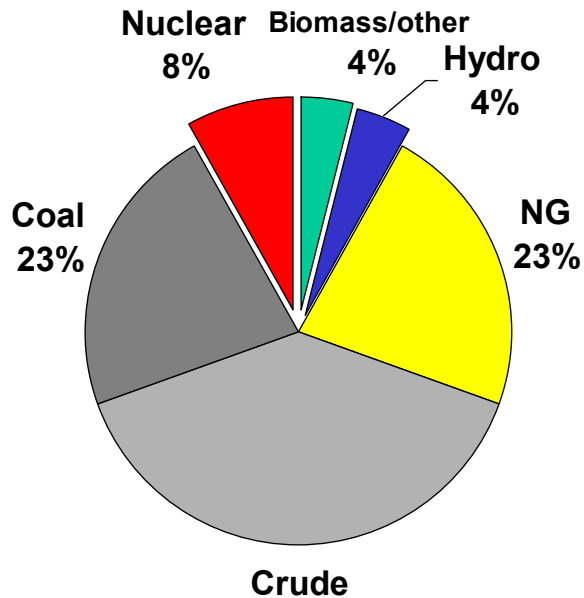
Biogas potentials based on yields



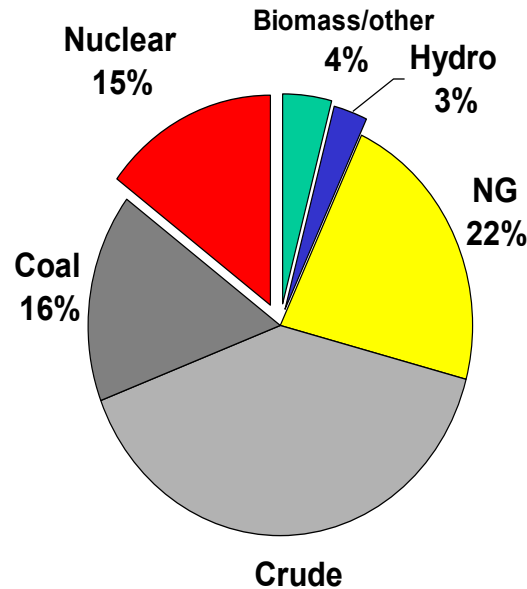
Developed Countries have significant biomass energy

Renewable Energy sources account for 4% of US and EU primary energy, excluding hydro.

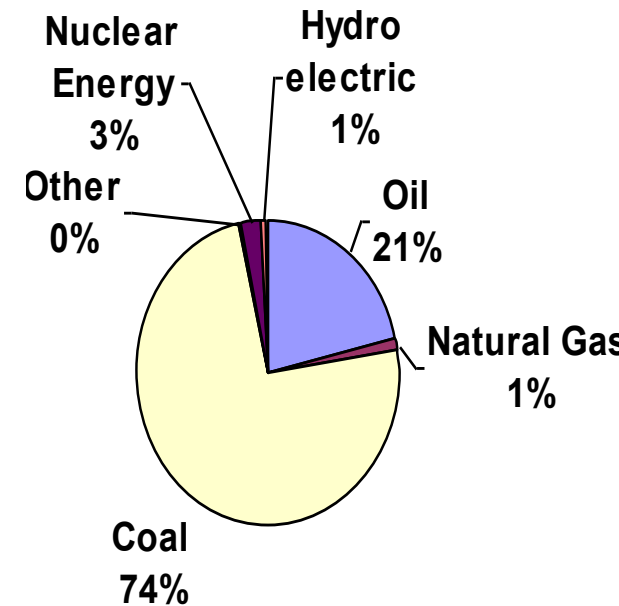
US



EU

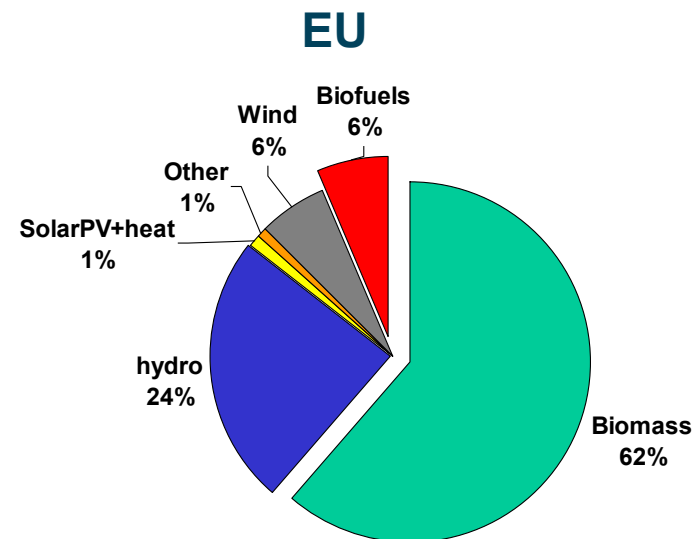
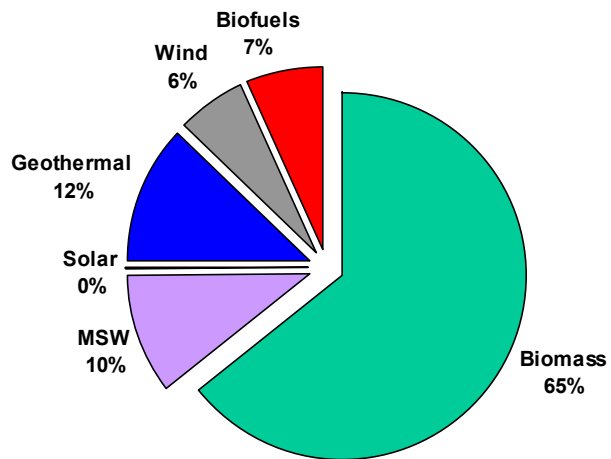


SA



Biomass is predominant renewable energy source

- US Department of Energy and European Commission forecast significant growth in AE capacity and generation over the next 15 years
- Anticipated AE mix is similar for the US & EU with biomass thermal technologies (CHP, co-firing) predominant
- AE could represent 6 – 8% of primary energy by 2025



Total = 920 TWh

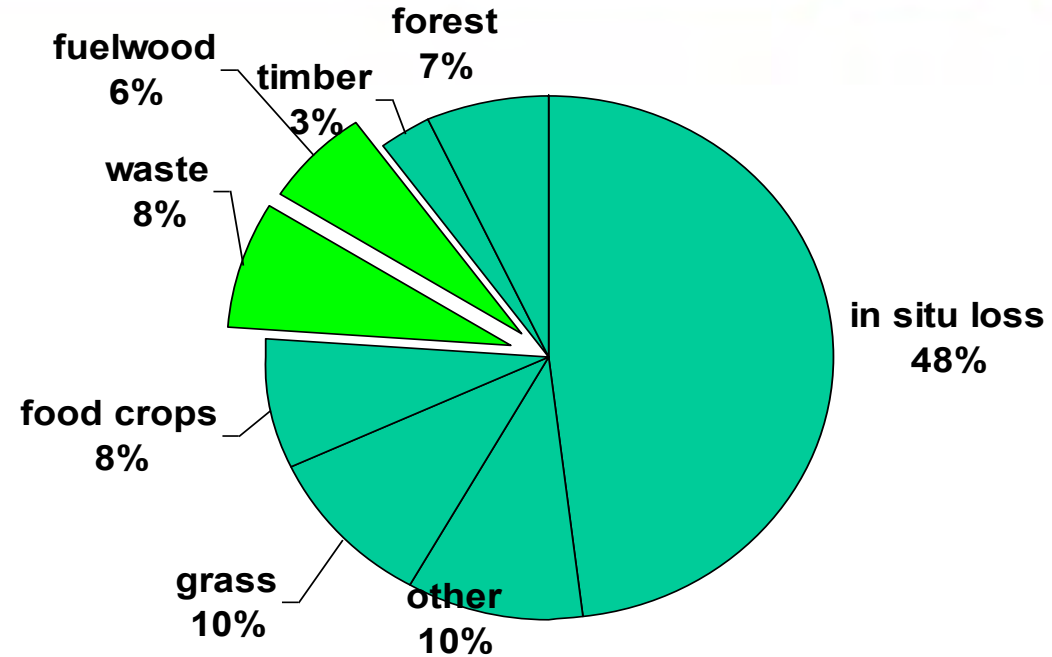
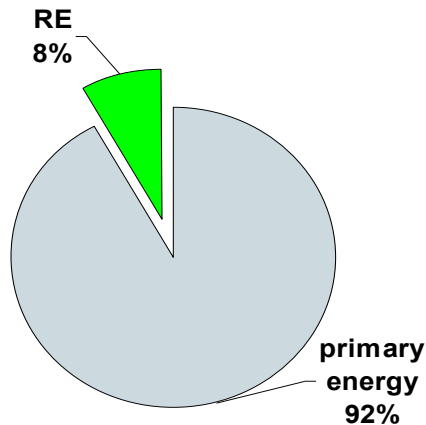
**Africa (least developed nations) lead in biomass use:
Needs more sustainability and efficiency**

BIOMASS IN THE WORLD

Region	Share of biomass in final energy consumption, %
Africa	60.0
South Asia	56.3
East Asia	25.1
China	23.5
Latin America	18.2
Europe	3.5
North America	2.7

Is there enough Biomass to meet energy needs?

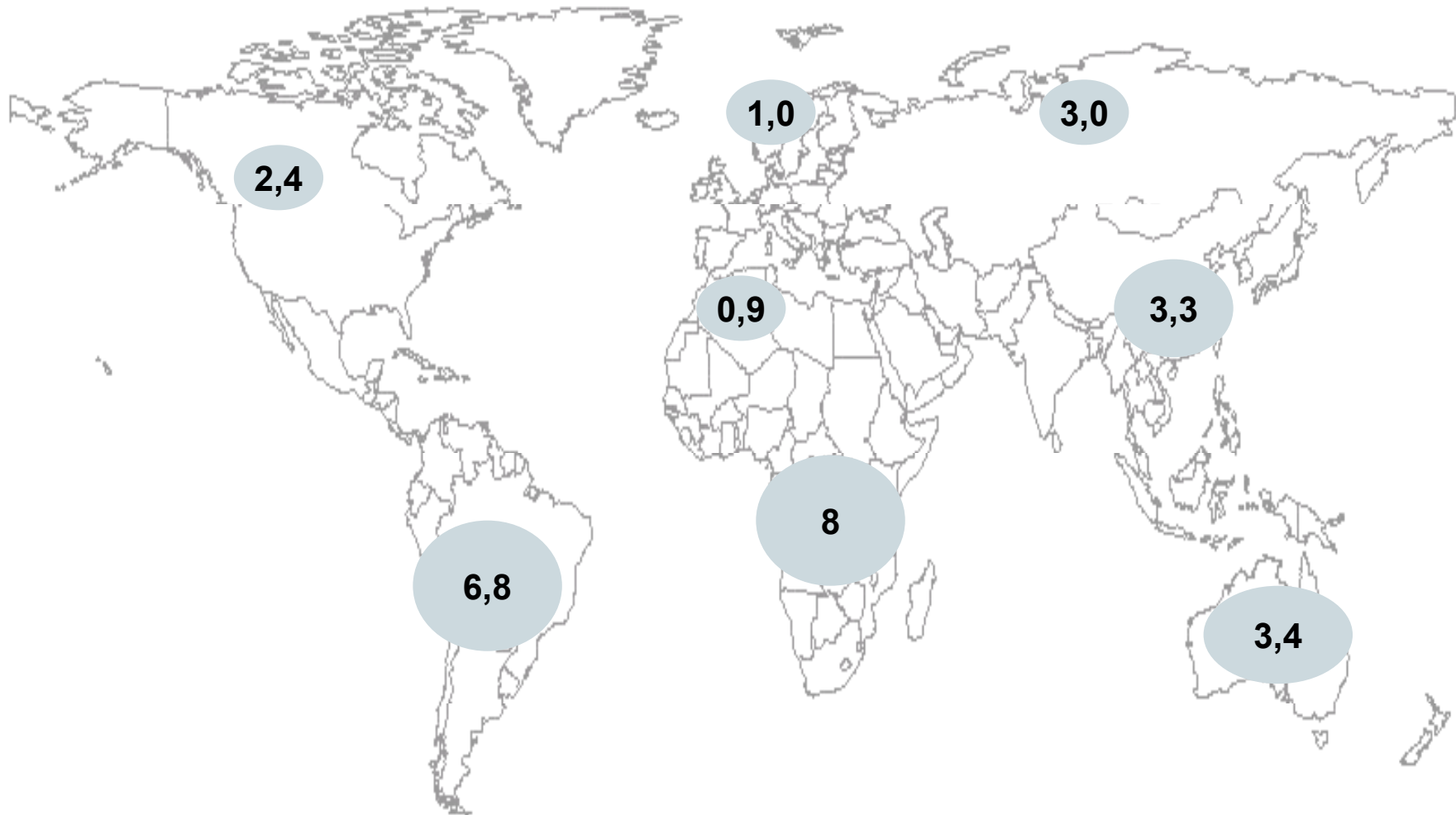
Global primary energy demand
~9.6 Gtoe pa



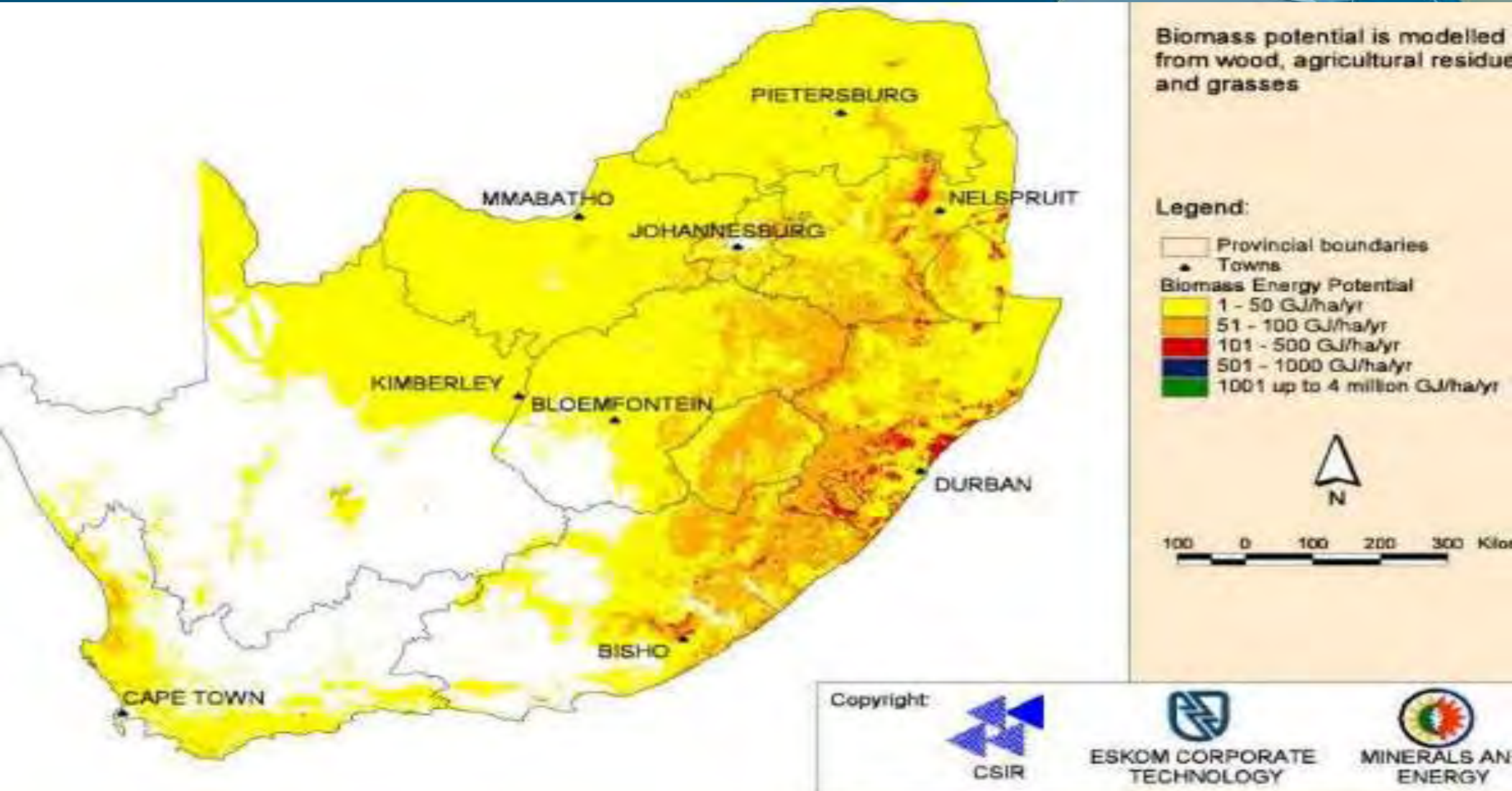
Global biomass sustainable production
~30 Gtoe pa

Current 0.8 Gtoe AE could increase to 4 Gtoe or 40% world demand using fuel wood and waste alone

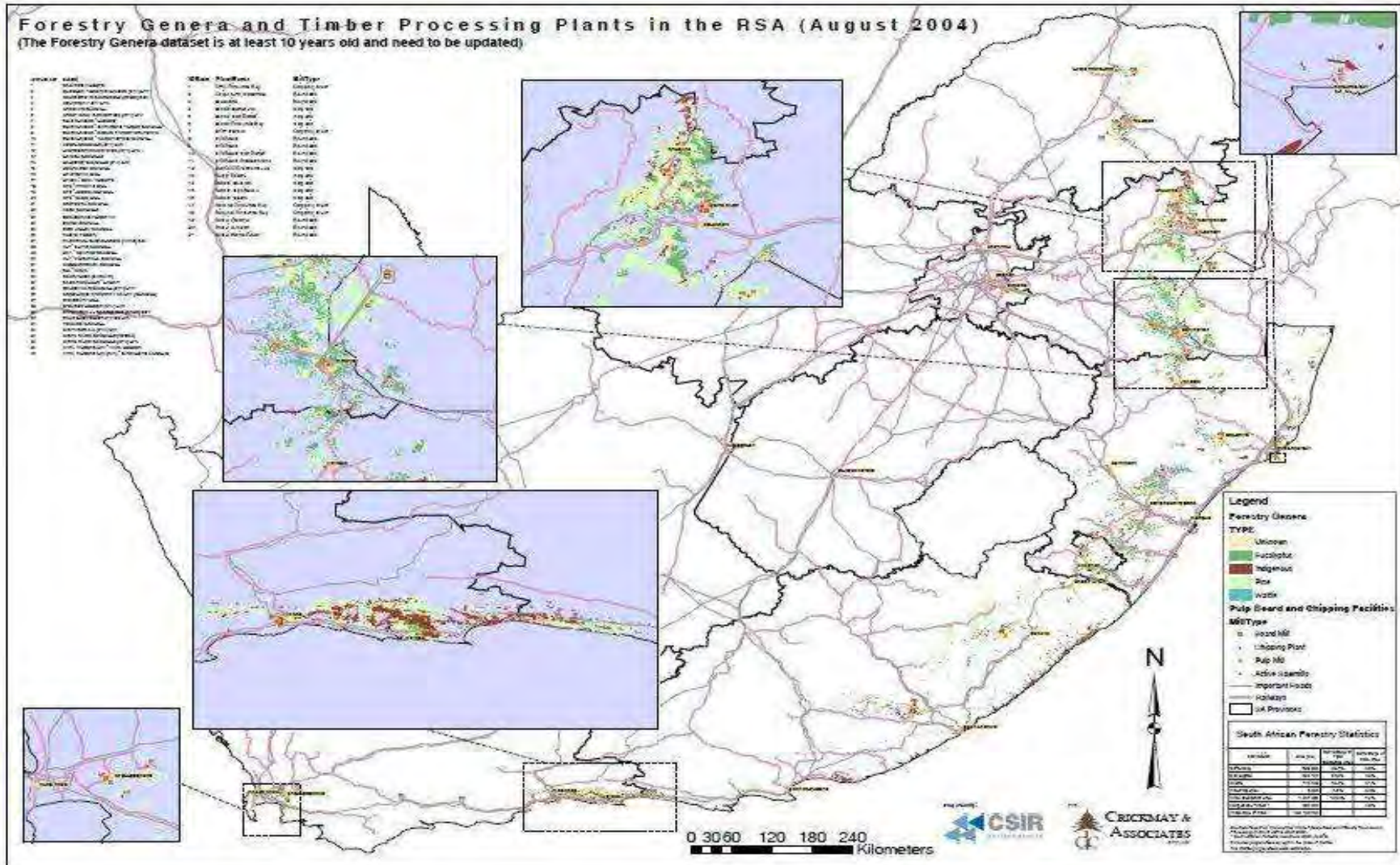
World biomass potential



SA Biomass Resource is limited



SA Forests



REFIT/REBID: Renewable “Electricity” Feed-in Tariff

- **Target 10,000 GWh by 2013 (set in 2003)**
 - 0.6 % of total energy, or
 - 4 % of electricity, or
 - 3 % of liquid fuels (petrol, diesel, Jet/IP)
 - **REFIT electricity prices proposed at 3x marginal cost of own electricity from coal (120c/kWh versus 40 c/kWh for coal, manpower, maintenance & operations)**
 - **OIL (Diesel, Paraffin) is IMPORTED (BoP) at 150 c/kWh equivalent**
- RE (as in countries where developed already) should target Oil (& imported) energy usage – highest cost*

Technology	1 st REFIT * R/kWh	March 2011	Today
Landfill gas	0.90 or 0.65	0.54	
Small hydro	0.94	0.67	0.94
Biogas	0.96	0.84	
Biomass	1.18		1.07
Wind	1.25	0.94	
Concentrated solar	2.09	1.94	
CSP with storage of 6 hours	2.31	1.40	
CSP no storage	3.14	1.84	
PV systems (≥ 1 MW)	3.94	2.31	

COFiT Hearings at NERSA 3 May 2011

- **70% the presentations were focused on Wood Chips & Bagasse**
- **Waste Heat & CHP COFIT only dealt with in general comments**
- **Nersa 'Wood Chips' category, inclusive of all mill wastes, too broad and tariff of 76.1c/kWh too low**
- **'Bagasse' tariffs of ≥ 185.3 c/kWh too high – threat to Pulp and Paper**
- **PAMSA propose 134 c/kWh**
- **Nersa LCOE input cost unrealistically low and not representative of current market costs**

General: Regulatory and Incentive Issues

ELECTRICITY:

- **Integrated Resource Plan 2 (IRP2010)**
- **Renewable Energy Feed-in Tariff:**
 - Selection criteria and procurement process, Power Purchase Agreements
- **Co-generation programme (COBID)**
- **Standard Offer Programme (Energy Efficiency Demand Side Management rules)**
- **Independent Power Producers framework**
 - Development of legislation for the creation of the Independent Systems and Market Operator
- **EIA's, License application process, Capacity at local Designated National Authority**

LIQUID FUELS AND GASES:

- **Taxes and incentives are main issues**

Electricity Allocations (Determinations ito IRP 2010)

Ministerial Oct 2012: Additional 3200MW renewable energy capacity includes:

- **CSP – 400MW; Wind – 1470MW; Solar PV – 1075MW;**
- **Biogas – 47.5MW**
- **Biomass – 47.5MW**
- **Small hydro (≤ 40) – 60MW;**
- **Small projects (≤ 5 MW based on the six renewable energy sources above) – 100MW**

Medium Term Risk Mitigation Plan 2012 (1274MW capacity to be procured) includes:

- **474MW to be generated from natural gas included under the IRP 2010-2030 new build options for the years 2019 to 2020.**
- **800MW to be generated from industrial cogeneration sources**

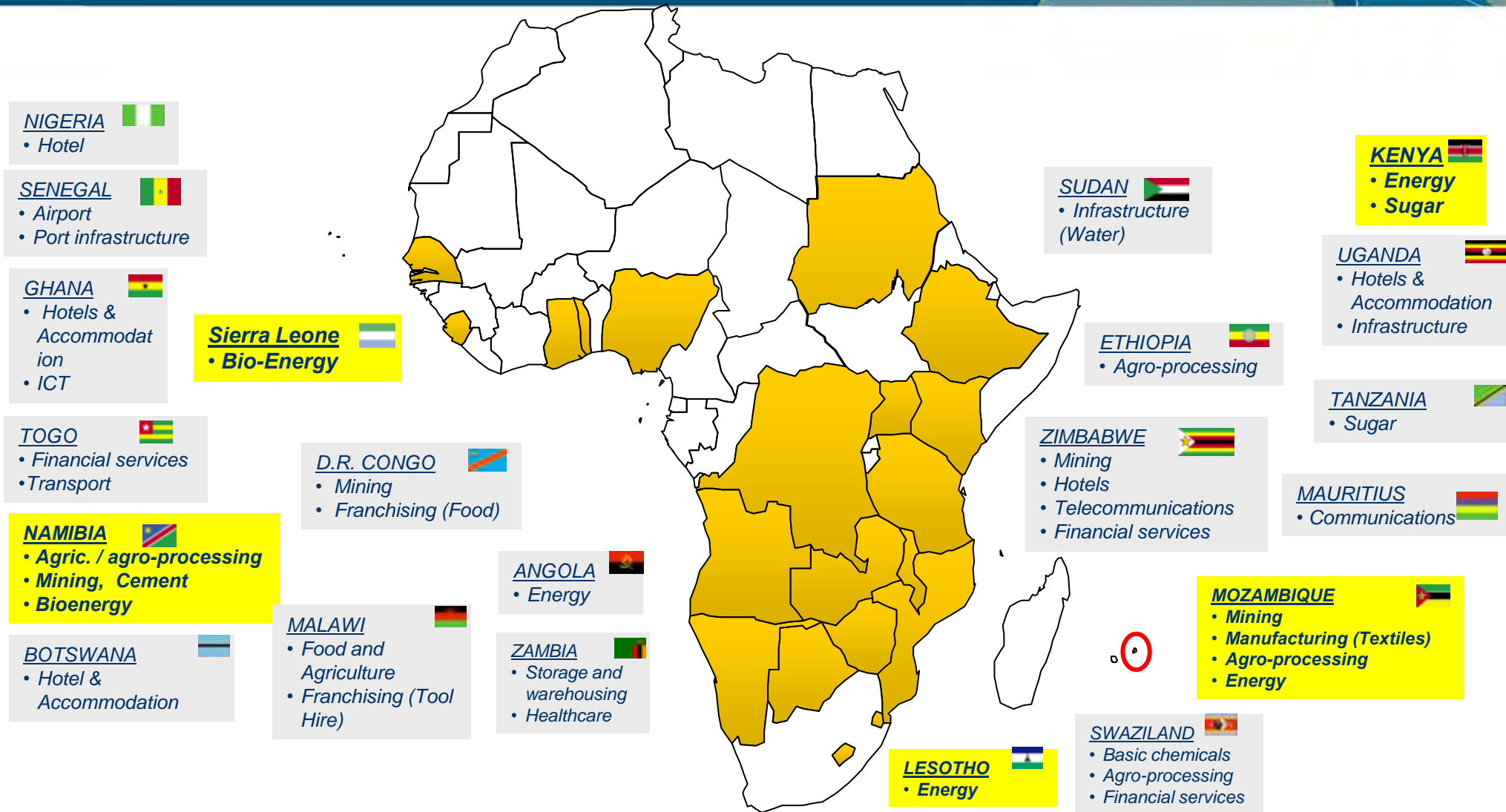
Baseload 2012: 7761MW to be procured includes:

- **2500MW from coal under the IRP 2010-2030 new build options for 2014 to 2024**
- **2609MW to be generated from hydro, IRP2010 imported hydro option**
- **2652MW to be generated from Natural Gas (CCGT & OCGT)**

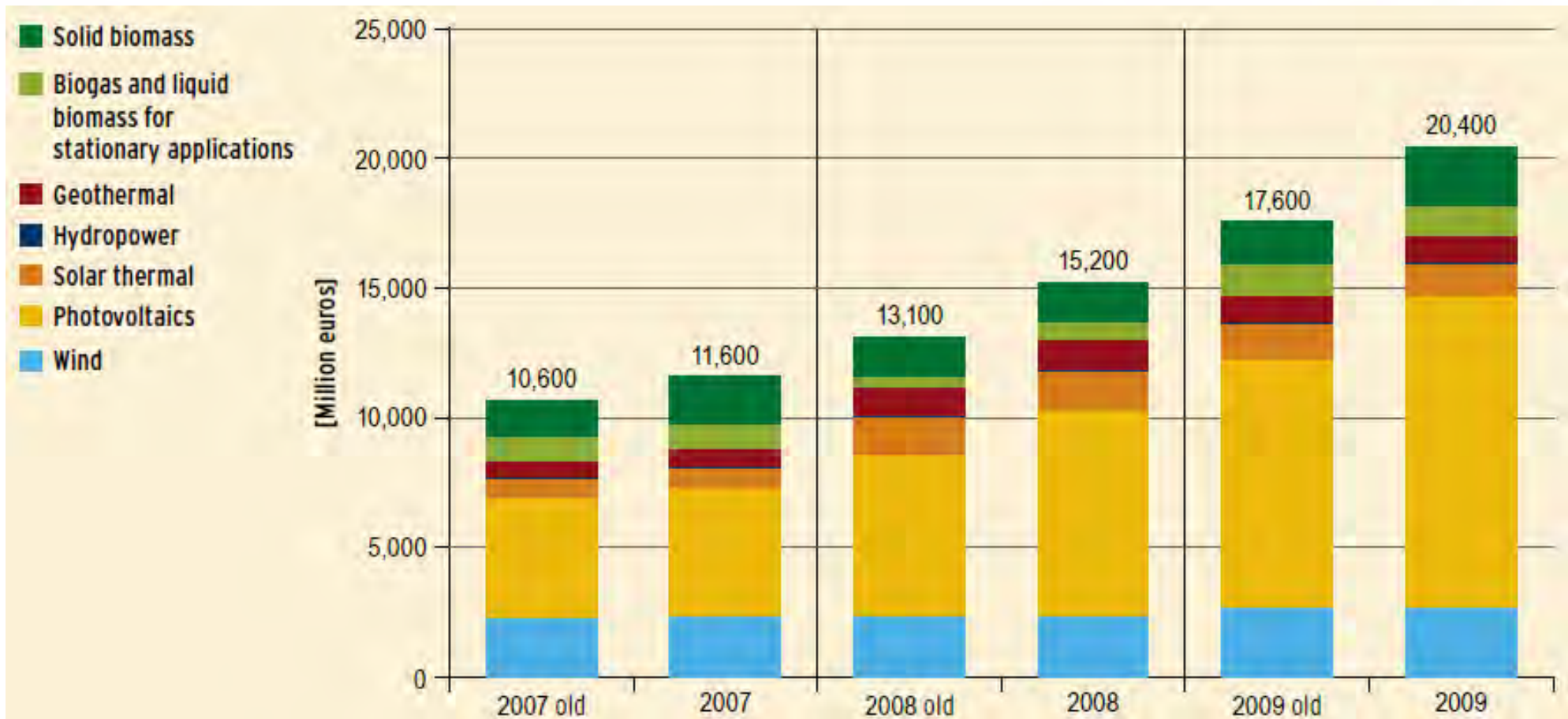
IDC Biomass Electricity and Power Projects considered

Description	MW	Value R mil	Jobs No. Potential
Mpumalanga A	8	265	150
Mpumalanga B	5	150	120
KZN A	12-36	500-1500	300
KZN B, C	10-30	1000	800
Limpopo A	5	150	100
Limpopo B	4	100	50
Gauteng	2 and 8	500	500
Eastern Cape A	15	500	100
Eastern Cape B	8	300	160
Western Cape	4	500	500
SADC	8	100	50
TOTAL	120	R 5 bil	3500

IDC footprint in the rest of Africa (31 March 2012)

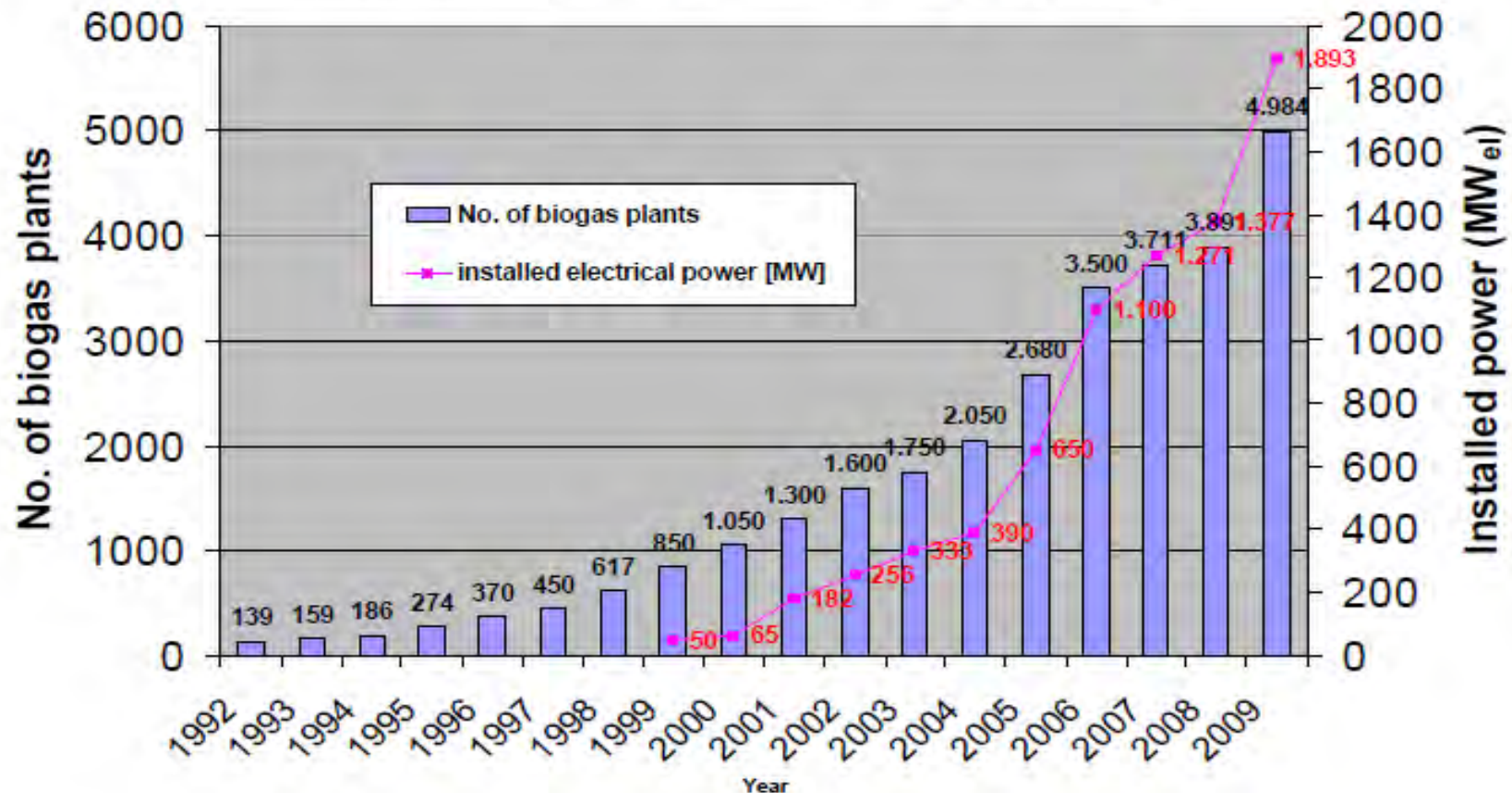


Renewable Energy Investments in Germany



Biogas in Germany

Success story in Germany, learning the lessons day by day



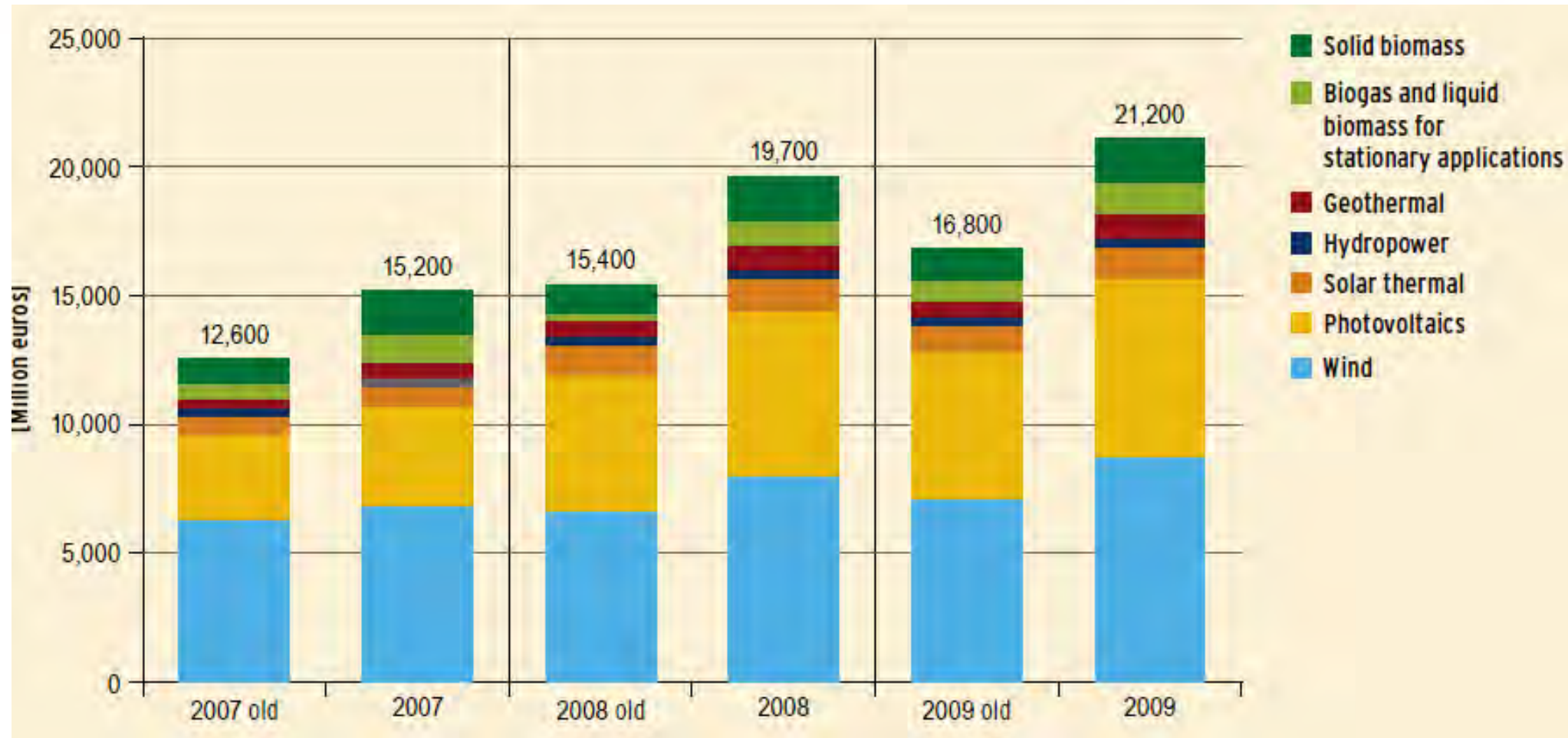
Macroeconomic benefits of biogas in Germany in 2005 and 2020 (estimate)

	2005	2020
1. Installed power (MW)	650	10.000
2. Electricity from biogas (TWh/a)	2,8	76
3. Share of total electr. production	0.8 %	17%
4. Annual Turnover for Constructors (Million EUR)	650	7,6
5. Annual Turnover for Operators (Million EUR)	>360	11,1
6. Effect on Employment	8	85
7. CO ₂ Emission Reduction* (Million t/a)	4	103

* calculated by substituting the electricity from the grid, about 700 g CO₂-eq/kWhel)

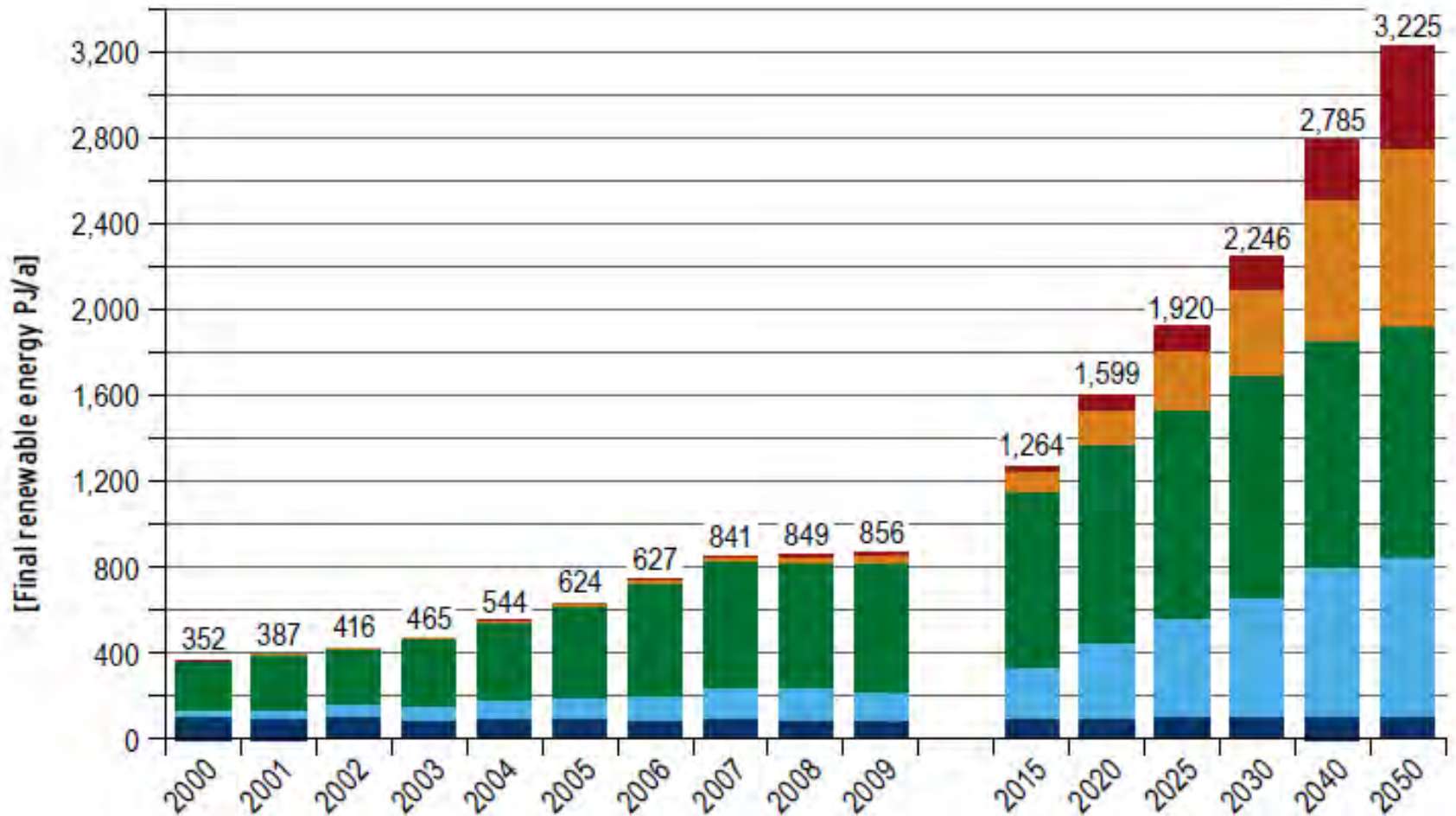
Source: GBA, German Biogas Association

RE in Germany: Turnover trends



Germany : RE Growth plan

- Geothermal
- Solar radiation
- Biomass, biogenic waste
- Wind
- Hydropower



Germany: RE Jobs trends

