

# LeNSes

## Sustainable Development through harvesting Renewable Energy: An overview of South Africa and the University

(RE is free everywhere Harvest! Harvest! Harvest!)

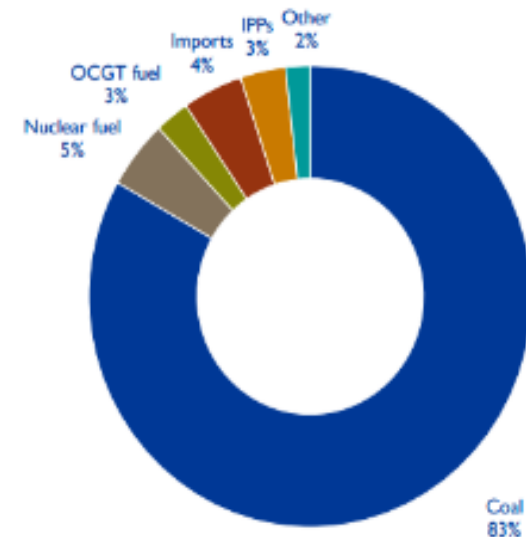


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## South Africa's energy background

- Turn of the Century World Focus shifted
  - Sustainable energy approach
  - Food security
  - Reduce carbon foot print
  - Stimulate economic growth
- Energy background in South Africa
  - Eskom generates 95 % of Energy for SA
  - 83 % is coal powered

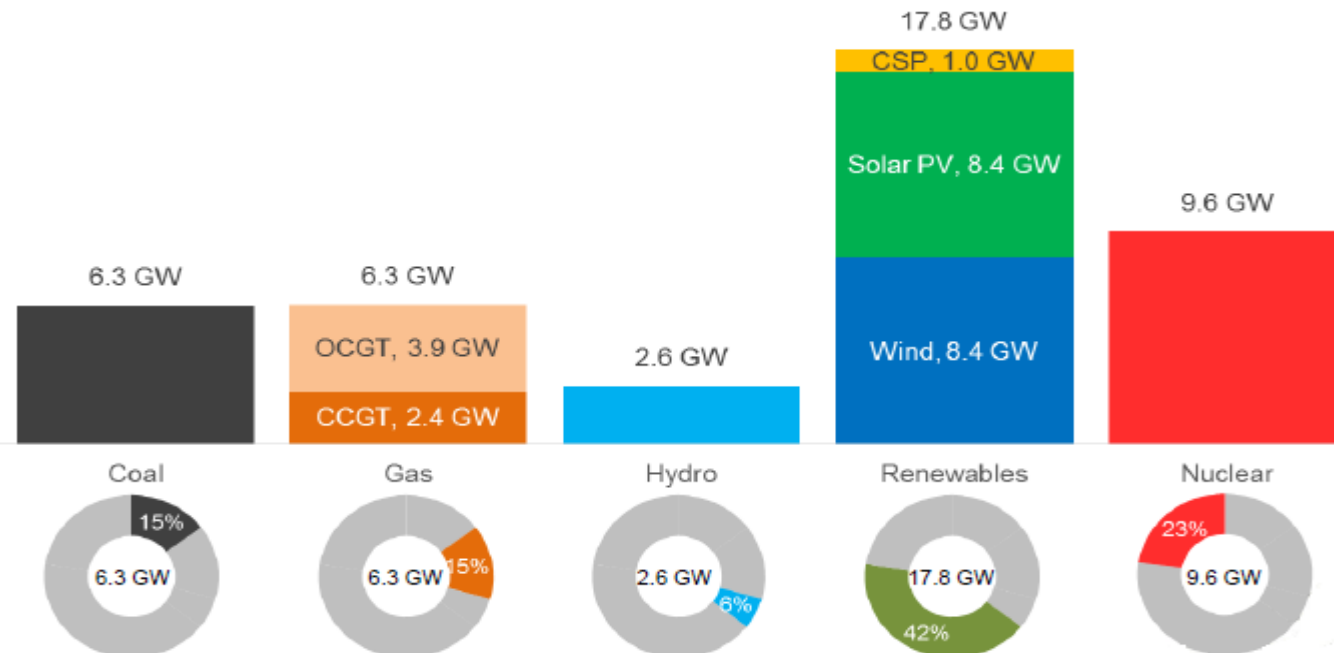


Eskom energy production Sept 2015:  
[http://www.eskom.co.za/IR2015/interim/Documents/Integrated\\_results\\_presentation\\_30\\_Sep\\_2015\\_Final\\_20151124\\_POST\\_EXCO](http://www.eskom.co.za/IR2015/interim/Documents/Integrated_results_presentation_30_Sep_2015_Final_20151124_POST_EXCO)

# South Africa's Plan

## IRP total additional capacity 2010-2030

- SA vision 30 % Cleaner energy mix by 2030
- The mission
  - Put in place appropriate regulations and policy (IRP)
  - Embark on international collaborative platforms (CoP and SAIREC)
  - Optimizing the natural environment (SA radiation amongst best in the world)
  - Find environmentally friendly resources to produce energy (REIPPPP)



# Renewable Energy Progress in SA

- **13 225 MW** – total Determinations for renewable (including Smalls)
  - **6 376 MW** Procured
  - **4 006 MW** Signed
  - **2 220 MW** Connected (44 Projects)
- **1 851MW** – Under evaluation, estimated value R61 billion.
- **4 998 MW** – available for future Bid Windows
- IRP 2010 target 17.8GW of renewable by 2030 which amounts to a potential **R450 billion of investment** by private sector.

## De Aar PV

175 MW



## Prieska PV

86 MW



## Bokpoort CSP

50 MW turbine  
capacity



## Khi Solar One

50 MW steam driven  
solar thermal plant



## Noupoort Wind

80 MW



## Touwsrivier CPV

50 MW

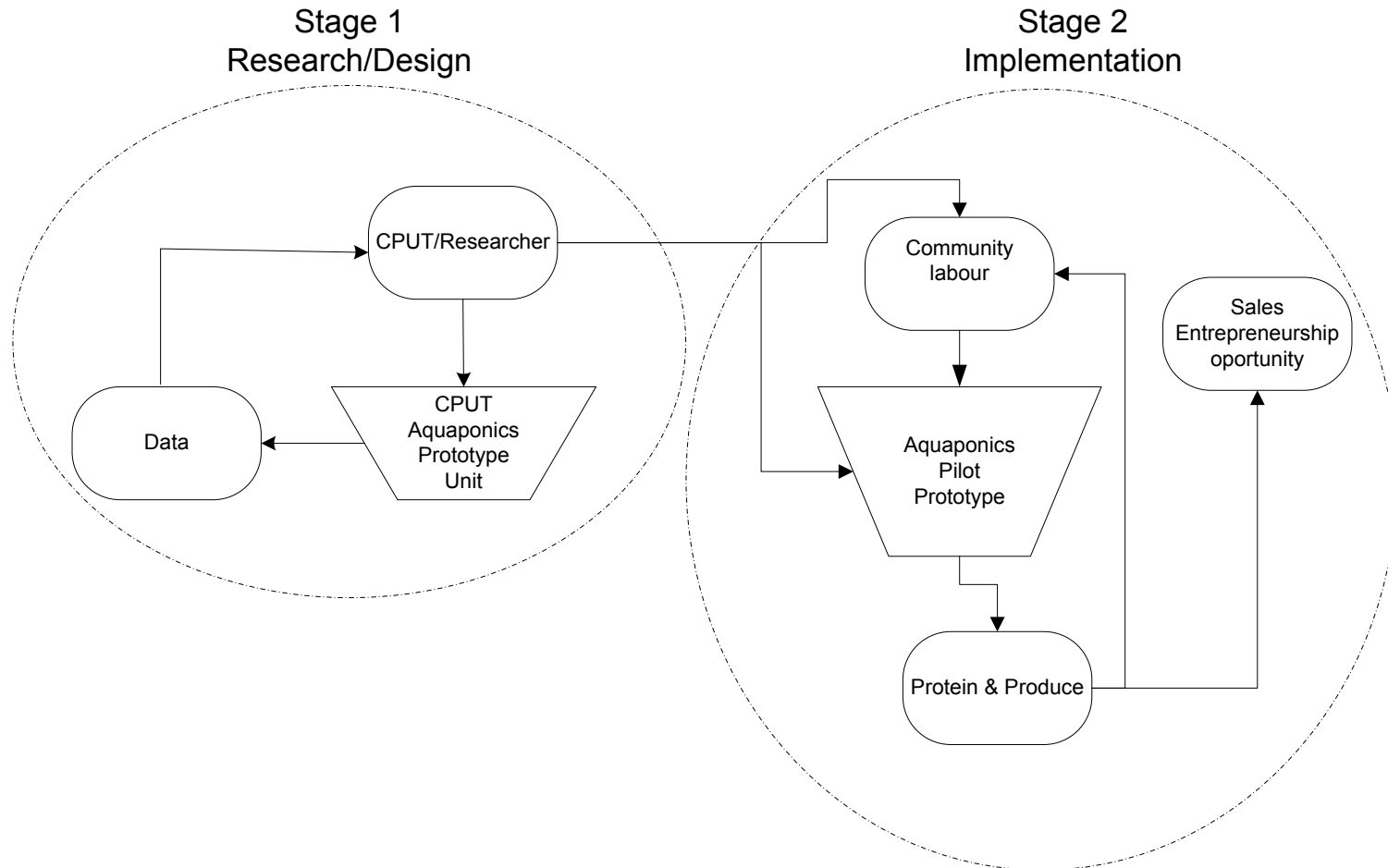




## **CPUT: An example of a small scale RE Aquaponics Project**

- What is the project about?
  - Combining new technology with existing technology to control and improve aquaponics environment to boost food production
- Goal of this project
  - Develop modular solar powered aquaponics system
  - Provide sustainable means of food security
  - Employ renewable energy
  - Familiarize needy communities with renewable energy
  - Stimulate entrepreneurship amongst needy communities

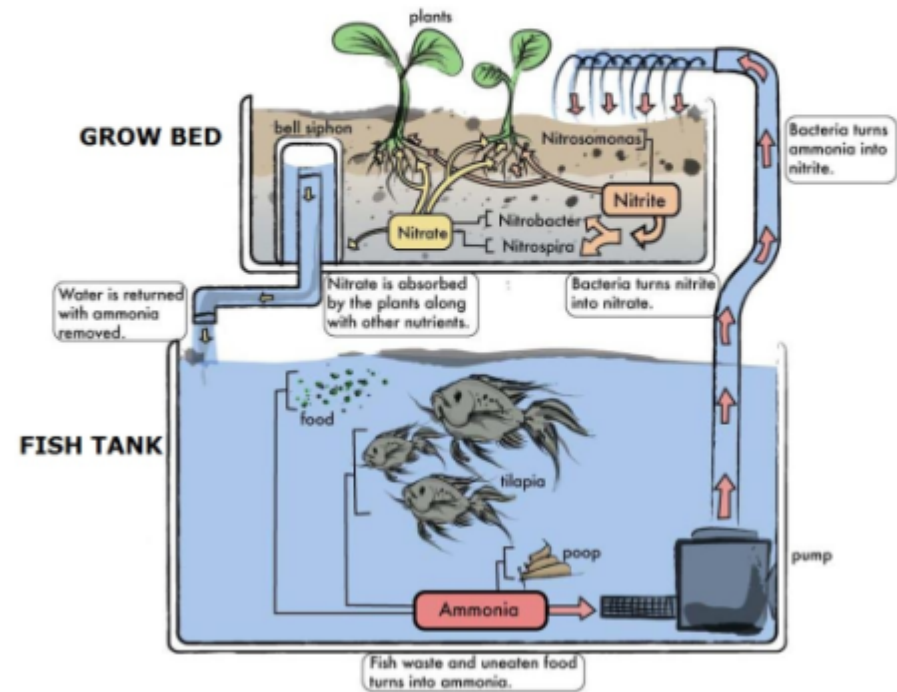
# Flow Process Diagram



# Aquaponics

- Aquaculture
  - Grow fish or crustaceans
- Hydroponics
  - Grow vegetables or fruit
- Symbiotic benefit to plants and fish
- Filtration Growbed Unit
  - Volcanic rocks and stone
  - Bacteria such nitrobacter and nitrospira thrives in this environment
  - They convert waste produced fish (ammonia) to phosphates and nitrates which is good for plant growth

**AQUAPONICS BASIC DIAGRAM**



<http://aquaponicsphilippines.com/wp-content/uploads/2013/01/Aquaponics-illustration.jpg>



# Modular solar powered aquaponics system

Provisional Patent Ref : PA161202



Battery Box

Stairs



PV Panels

Electronic Box

Fish Tank

Sump Tank

Canopy

Grow Bed

Frame

Solar Water Heater (SWH)

# Challenges faced when breeding fish

- Swim Bladder Disorder
- Bacterial Infection
- Escalating death rate



Measuring fish using  
20x20mm grids

# Plant Growth Rate

## Month of September 2015

Lettuce



Grow bed 1: 9 September 2015



Grow bed 1: 29 September 2015

Cherry Tomatoes

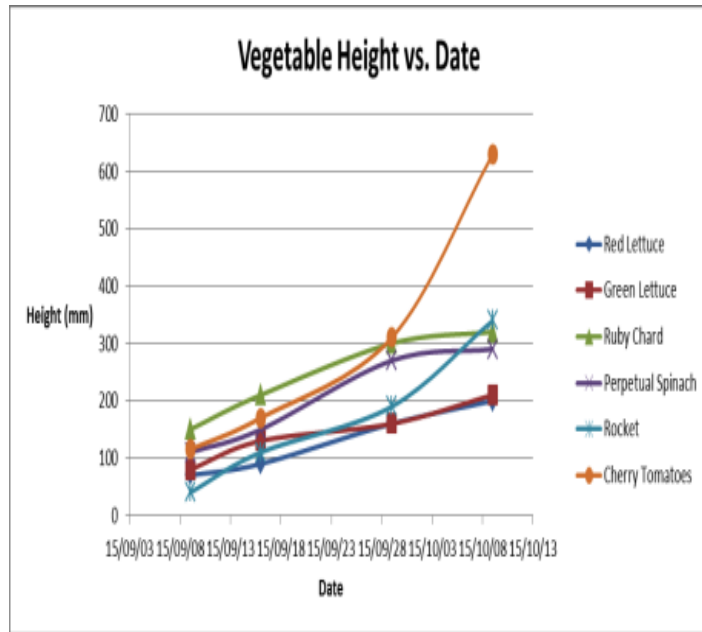


Grow bed 2: 16 September 2015



Grow bed 2: 29 September 2015

# Community Beneficiaries



Plant growth rate total number of weeks: 5 weeks, total number of days: 35 days to harvest



# Examples of RE Design

The CIS Tower in Manchester, England was clad in PV

**Be careful of future development casting shadows on PV**



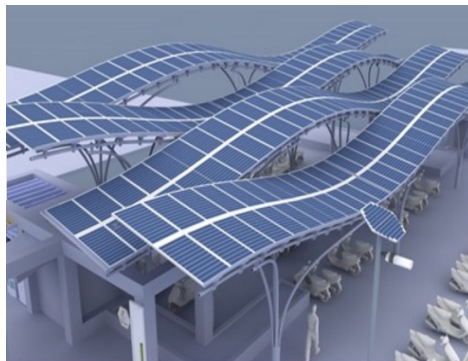
**Functional** highway sound barrier walls clad with PV



<http://cleantechnica.com/files/2015/02/PV-EU.png>

More aesthetics

**Be careful of casting shadows overlapping PV**



<http://sine.ni.com/cs/app/doc/p/id/cs-15386#prettyPhoto/gallery/0/>

Functional PV Shaded Parking Charging Station



[https://en.wikipedia.org/wiki/Photovoltaics#/media/File:Ombri%C3%A8re\\_SUDI\\_-\\_Sustainable\\_Urban\\_Design%26amp;Innovation.jpg](https://en.wikipedia.org/wiki/Photovoltaics#/media/File:Ombri%C3%A8re_SUDI_-_Sustainable_Urban_Design%26amp;Innovation.jpg)



# We are challenged by our power giant Eskom

- Eskom stopped signing off IPP's
- Contrary to Government Policy
- Anti-competitive towards IPP's
- Eskom's reason: no power cuts and lesser energy demand over past year
- Difficult to catch if our economy improves
- Bad reflection on our progressive RE plan



## In Conclusion

- Take the bull by the horns, Renewable Energy is supplied free by our Sun. “Harvest! Harvest! Harvest! everywhere you can.



Thank you!!

LeNSes



*"Try blowing on it."*