

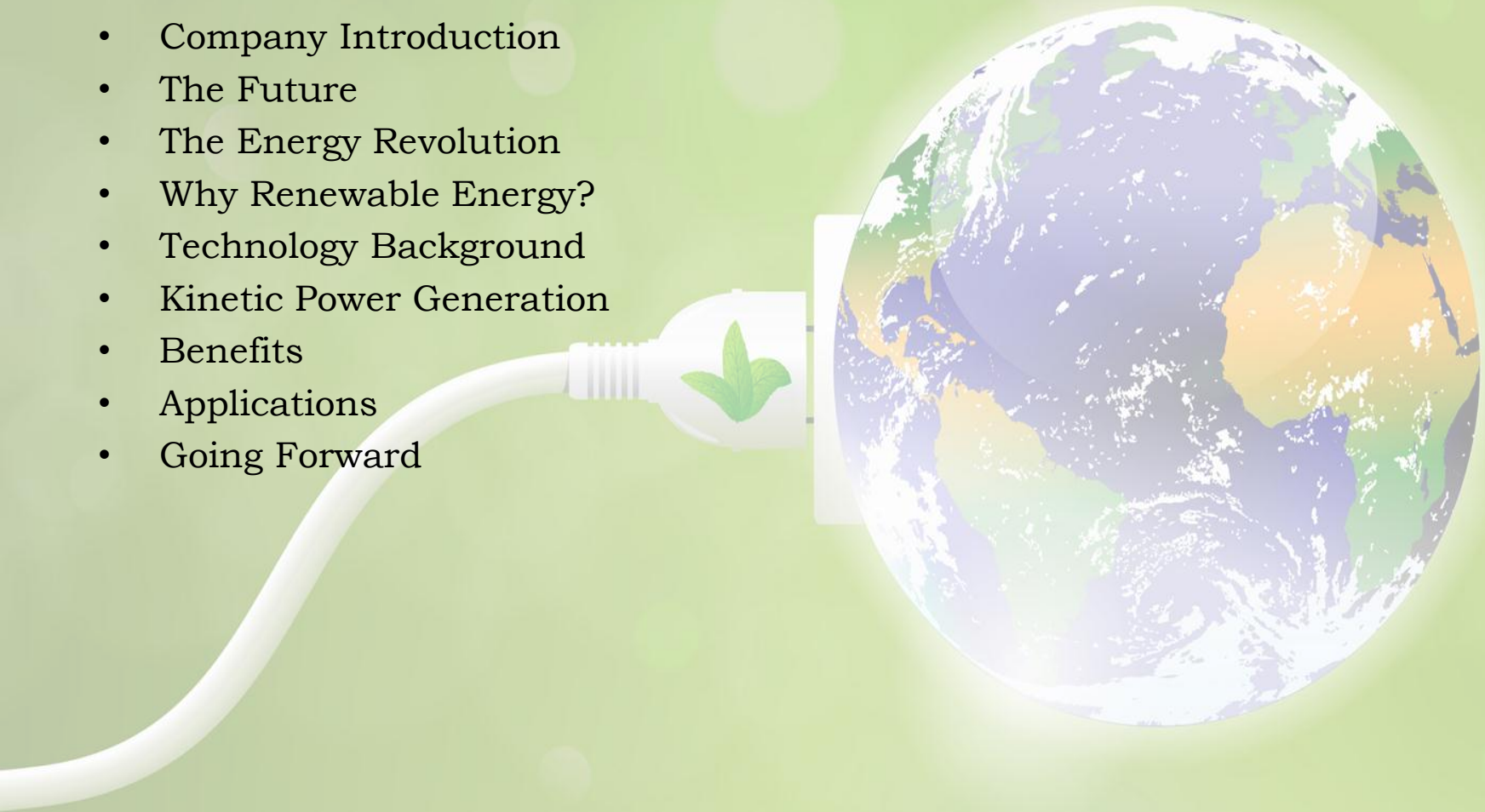
INTRODUCTION TO KINETIC POWER GENERATION



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4 April 2014
Royal Haskoning DHV

Agenda

- Company Introduction
- The Future
- The Energy Revolution
- Why Renewable Energy?
- Technology Background
- Kinetic Power Generation
- Benefits
- Applications
- Going Forward



Company Introduction

- Rosch Innovation AG is an incorporated company located in Switzerland with headquarters in Amriswil;
- Its corporate purpose is patent development and realisation and exists since 2011;
- Emphasis is put on commercialisation and efficiency;
- Research and development department is located in Serbia;
- Engineers, scientists, and technical experts research the new and further develop Rosch patents;
- Rosch AfrAsia Marketing (Pty) Ltd
 - Agency for Africa & Asia
 - Offices located in Polokwane

The Future

- Today there are approximately 920 million people living in Africa;
- Currently, a third of South Africa's population does not have energy access; those that do often cannot afford it.;
- In 2050, the African population will have grown with an estimated 2,6 billion individual;
- In 2050 Africa will need 360% more food than was produced in 2006;
- Africa will have to increase its economic productivity with 8% per year to cater for the growing middle class and its workers;
- It is a warning to all, that more industries, factories, businesses, construction and expanding residential areas will follow, and an increase of electricity utilisation, water usage and environmental issues will emerge and must be professionally managed to stabilise the future.

– James Hall – Africa Monthly Monitor – Consultancy Africa Intelligence

The Energy Revolution

- The Government's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) is limited to 9% renewable energy (RE) by 2030 with a focus on security of supply as opposed to access to power;
- This limitation, along with the government's latest energy proposals will not only make curbing the country's CO₂ emissions almost impossible, but it will also create many social problems including health impacts and substantial water wastage and environmental pollution;
- Eskom and the government need to be responsible for more RE development than is currently planned;
- To achieve this, grid transformation is also necessary to ensure meaningful expansion throughout the country. South Africa has the opportunity to leapfrog fossil-fuelled development by embarking on a world-leading ambitious RE and energy - Alastair Gets; March 2013. **Powering the Future - Renewable Energy Roll-out in South Africa**, Greenpeace

Why Renewable Energy?

**Electricity
Demand**



GROWING

South Africa needs 52GW of new generation capacity in the next 20 years.

**Renewable
Potential**



UNTAPPED

**Economic
Benefit**



SIGNIFICANT

Developing a critical mass of renewables would deliver major economic and industrial benefits.

Untapped Opportunity

“Some of the main benefits of the White Paper will be renewable energy for rural communities, far from the national electricity grid, remote schools and clinics, energy for rural water supply and desalination, and solar passive designed housing and solar water heating for households in urban and rural settings and commercial applications. Large-scale utilisation of renewable energy will also reduce the emissions of carbon dioxide, thus contributing to an improved environment both locally and worldwide” **White Paper on Renewable Energy (2003)**

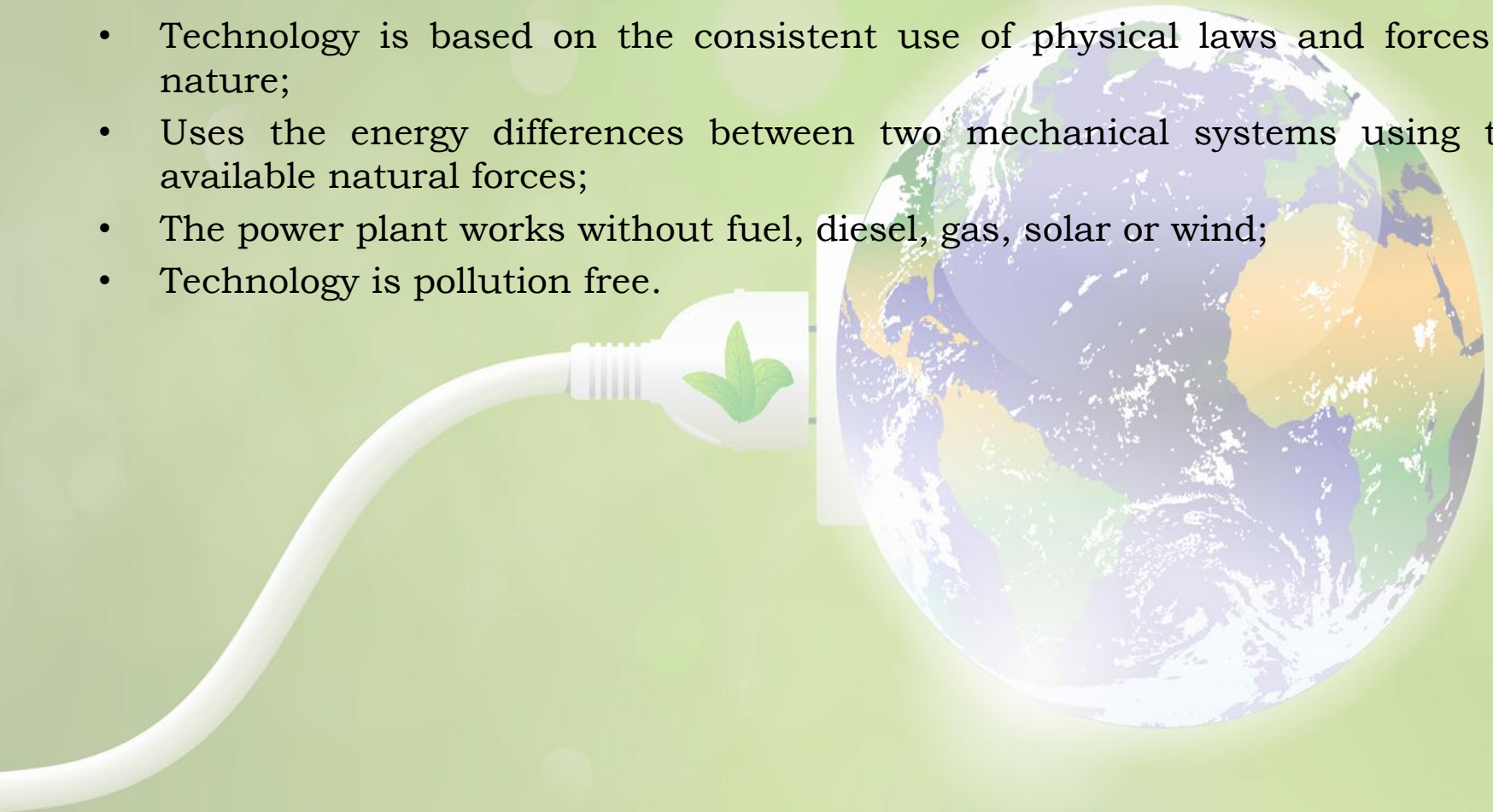
Kinetic Power Generation can be used to take advantage of this opportunity

Untapped Opportunity

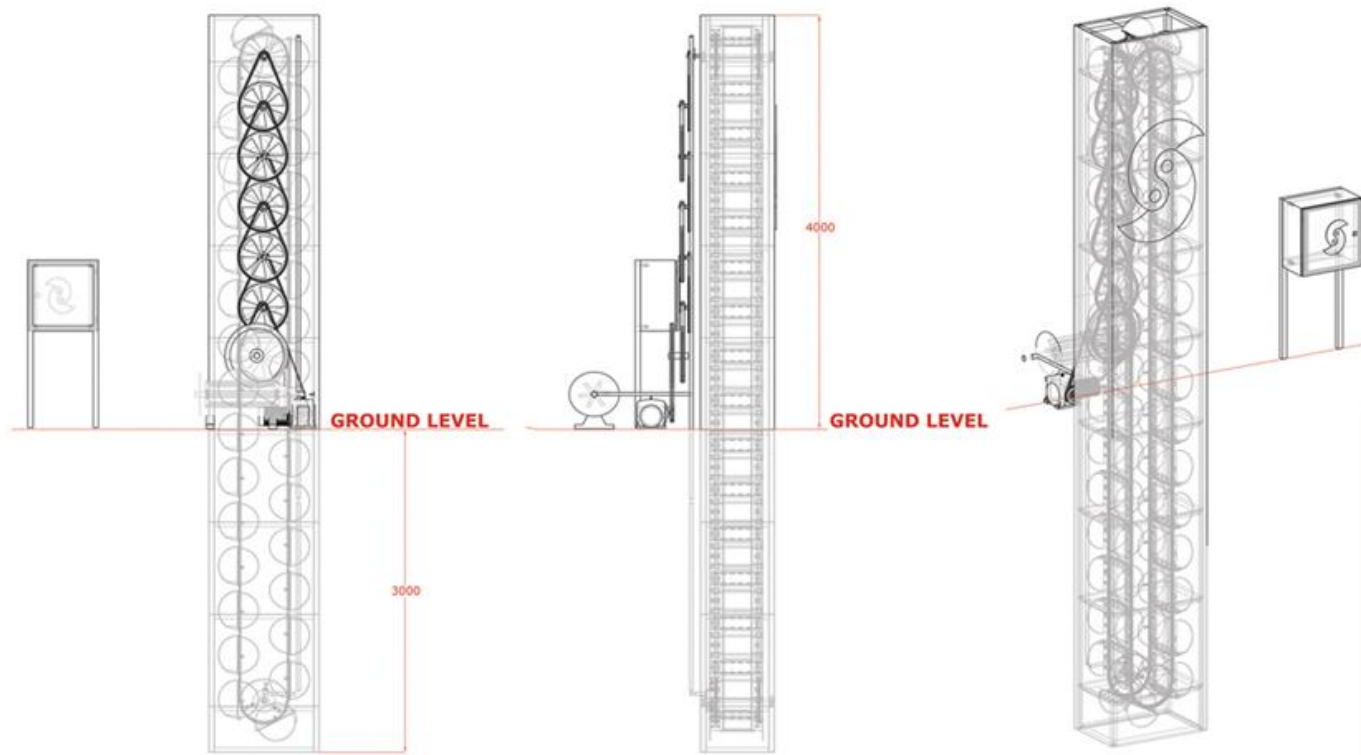
- An Independent Power Producers (IPP) Procurement Programme has been designed so as to contribute towards the target of 3 725 MW and towards socio-economic and environmentally sustainable growth, and to start to stimulate the renewable energy industry in South Africa;
- The following technologies is considered as qualifying technologies for selection under the IPP procurement programme:
 - Onshore wind (1850 MW)
 - Concentrated solar thermal (200 MW)
 - Solar photovoltaic (1450 MW)
 - Biomass solid (12,5 MW)
 - Biogas (12,5 MW)
 - Landfill gas (25 MW)
 - Small hydro (75 MW)

Technology Background

- Technology is based on the consistent use of physical laws and forces of nature;
- Uses the energy differences between two mechanical systems using the available natural forces;
- The power plant works without fuel, diesel, gas, solar or wind;
- Technology is pollution free.



Technology Background



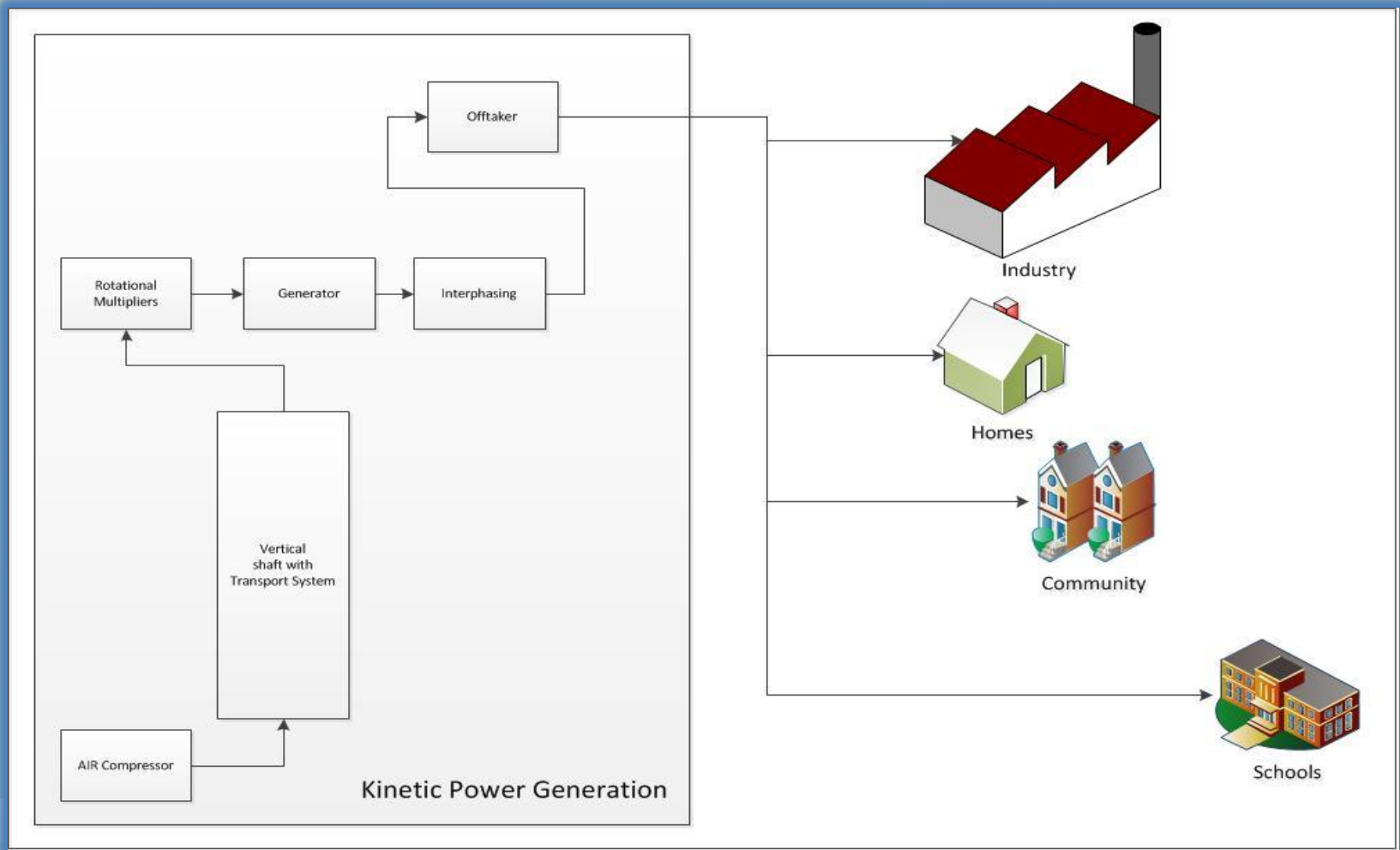
Kinetic Power Generation

- Called a Thrust Kinetic Power Plant;
- Consists of column filled with water wherein plastic chambers are submerged and connected to a transportation system;
- The transport system serves to direct the movement of the chambers from the top to the bottom of the well and reversibly in a circle;
- At the bottom the chambers are filled with air and under the influence of Archimedes Law gains thrust towards the top. The first chamber filled with air starts to drive the entire system. As the next chamber reaches the lower position it also gets filled with air, as well as every other coming one after another;

Kinetic Power Generation

- When the chambers reaches the top, the air is discharged to atmosphere and the chambers get filled with water in order to obtain their submerging towards the bottom;
- With every chamber that is filled with air, the movement becomes stronger and after several minutes the maximal rotation of the system is obtained;
- The gained kinetic energy is transferred via chains and gears (rotational multipliers) onto a three phase generator;
- Using newest technology with neodymium magnets and with the assistance of the rotational multipliers, the generator converts mechanical rotary movements into AC electrical energy.

Basic Power Generation

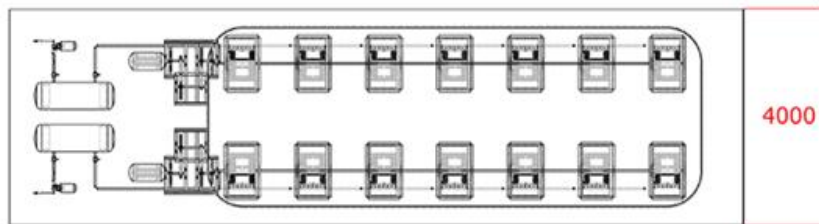
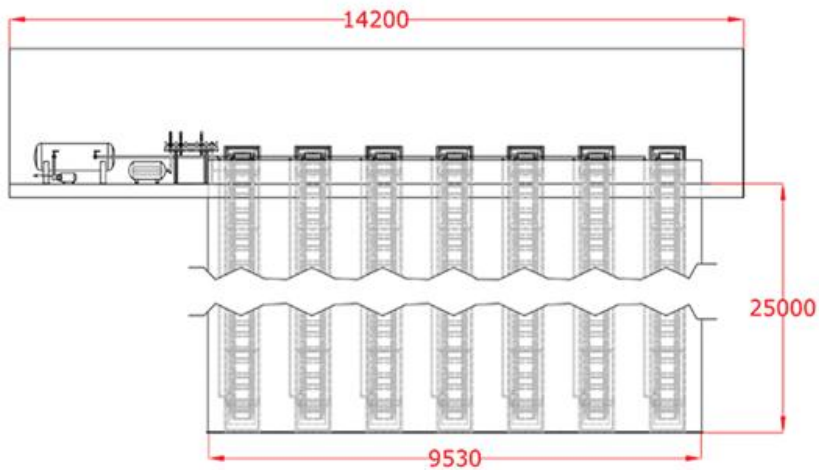


Technical Specifications



	KPP – 5 1 Module	KPP – 40 8 Modules	KPP – 100 20 Modules
Total Performance	5 MW	40 MW	100 MW
Type	Thrust Kinetic Power Plant	Thrust Kinetic Power Plant	Thrust Kinetic Power Plant
Nominal Power	5 MW	40 MW	100 MW
Power by Stroke	500 kW	500 kW	500 kW
Number of Strokes	10 + 4	80 + 32	200 + 80
Number of Generators	14	112	280
Average Production	43 200 MWh	345 600 MWh	864 000 MWh

Technical Specifications



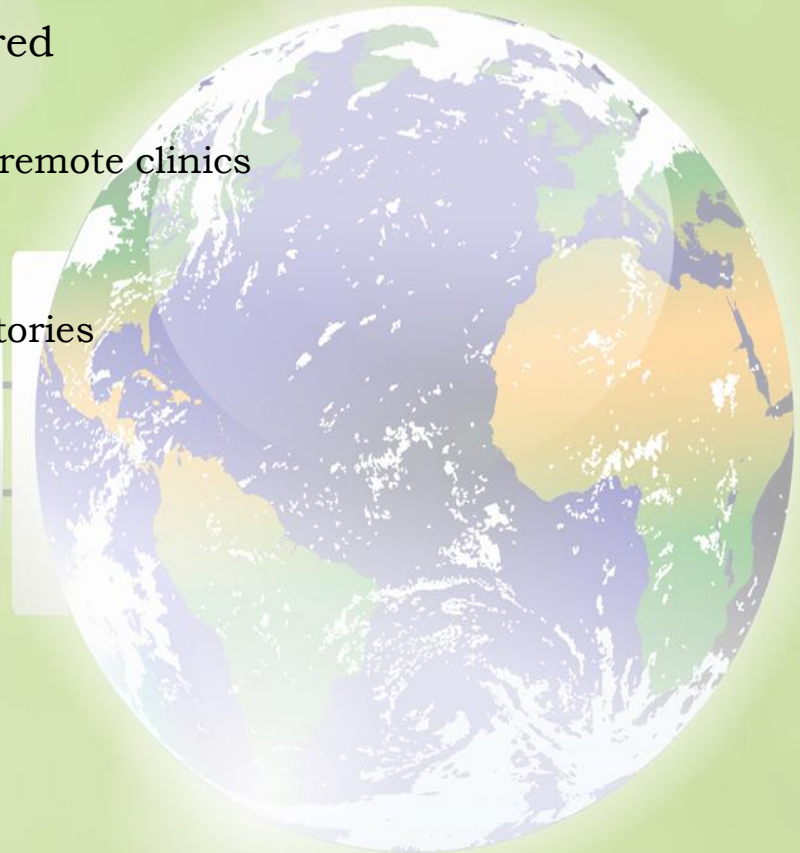
Measurement	KPP - 5	KPP - 40
The installation is under the surface in a basin filled with water		
Height above ground	2,5 m	2,5 m
Depth under ground	25 m	25 m
Width – Long side	14 m	32 m
Width – Short side	3,5 m	14 m
Basin	1 unit	8 unit
Basin measure	9,5 x 4 x 25 m	9,5 x 32 x 25 m
Basin Material	Reinforced concrete wall	

Benefits

- Modular & easy expandable;
- Small footprint;
- Baseload capable as it is not dependent on exogenous power like wind or the sun;
- Low operating & maintenance costs;
- Clean green technology with no air emissions and effluents;
- Uninterrupted power generation with;
- Firm supply installations;
- Short implementation period (Less than 12 months);
- Quick availability of power;
- Can be located close to the off-taker / buyer.

Applications

- From 5 MW to any Mega Watt required
- Municipalities
 - Rural communities, remote schools, remote clinics
 - Water & sewerage treatment plants
- Off-grid Areas
 - Small businesses, mines, plants, factories
- Special Economic Zones (SEZ's)
 - Anchor tenant
- Corporations
 - Security of supply
 - Reducing Eskom exposure
 - Green intent



Applications

- Independent Power Producers
 - Low power producing costs
 - Baseload capability
 - Short distribution networks
 - Land use
- Developments
 - Not dependent on Eskom
 - Shorter implementation period
 - Attraction
- Developed Areas
 - Small footprint





Thank You

Any Questions?