

South Africa's hydroelectricity success

A case study of the first hydro power project in South Africa since the mid 1980's...

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Seline van der Wat
Project Manager

*Workshop on Small Scale
Hydroelectric Installation*

Pretoria

11 May 2011



Introduction

- NuPlanet
- Bethlehem Hydro
 - Timeline
 - BH sites
 - Milestones
 - Challenges faced
 - Carbon trading
- South Africa hydropower market outlook

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seline@nuplanet.co.za

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NuPlanet Project Development

- 2006
- Develop, Build, Own, Operate
- IPP
- 2 running plants (first in RSA in over 2 decades)
- 3 projects: ownership rights; currently under development in Southern Africa
- Developing a large portfolio of multiple sites: pre-feasibility
- www.nuplanet.co.za

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Bethlehem Hydro

- 1999
- Players:
 - Developers: NuPlanet
 - Consultants: Ninham Shand (Aurecon) - (BWG Hydro & Merz Mclellan)
 - Constructing engineers: Eigenbau
 - Boving Fouress Limited (BVL), India
- Two separate hydropower plants
 - 7MW in total
 - Ash River and Sol Plaatje dam

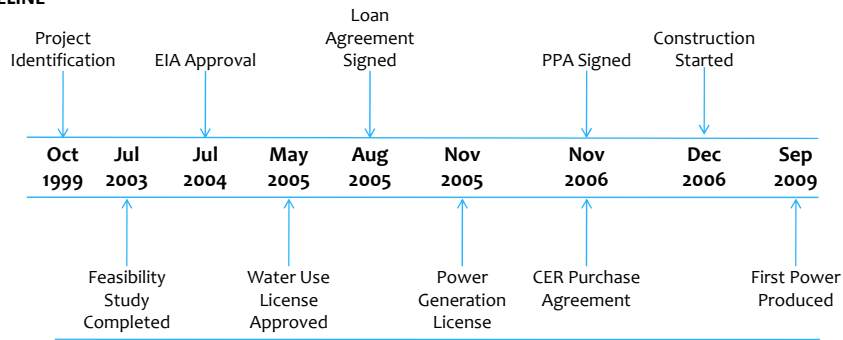
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Bethlehem Hydro timeline

TIMELINE



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Bethlehem Hydro

Merino Plant
Gross head – 14m
Run-of-river Installation

4 MW
25 cumec

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Diversion Weir

Adjacent to the intake of the canal
On Ash River
15km from LHWP outlet tunnel

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0,8 km canal

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Spillway



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Spillway in use

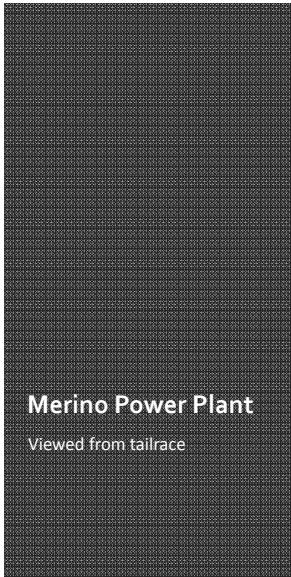


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Merino Power Plant

Viewed from tailrace



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Double regulated horizontal axis Kaplan

3.1 m diameter
Supplied by Boving Fouress Limited (BVL), India.

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Interconnection

- Eskom
- Node substation – 18km
- 22kV dedicated line

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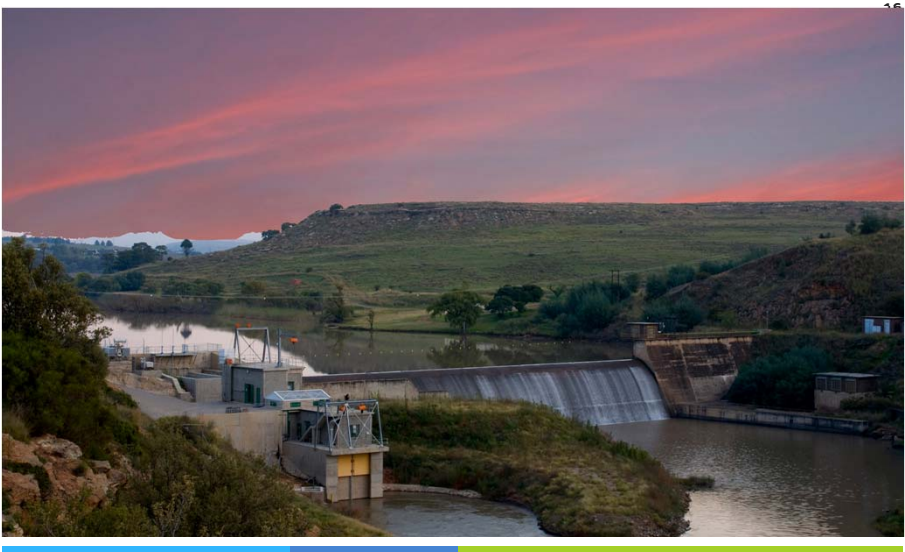


Bethlehem Hydro

Sol Plaatje Plant	3MW
Gross head – 11m	30 cumec
Dam Installation	

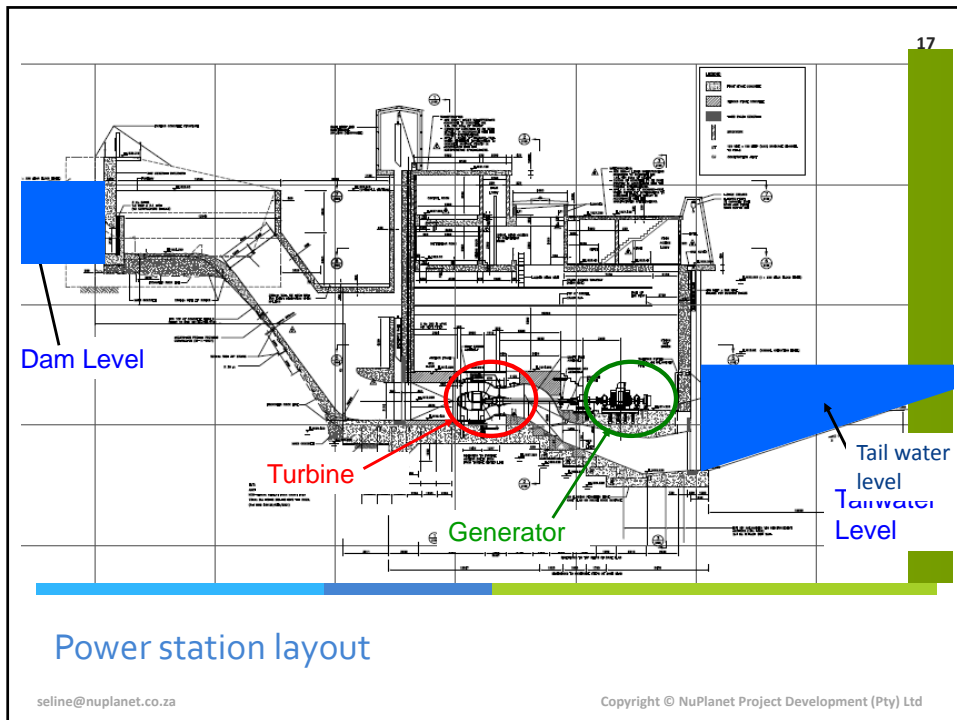
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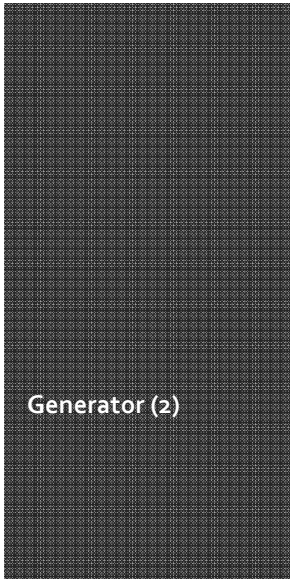
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Sol Plaatje Dam fed by Liebenbergsvlei and Ash Rivers

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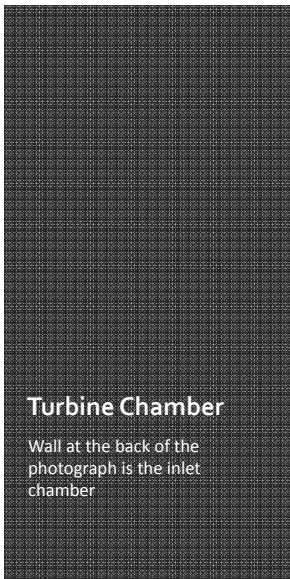


Generator (2)

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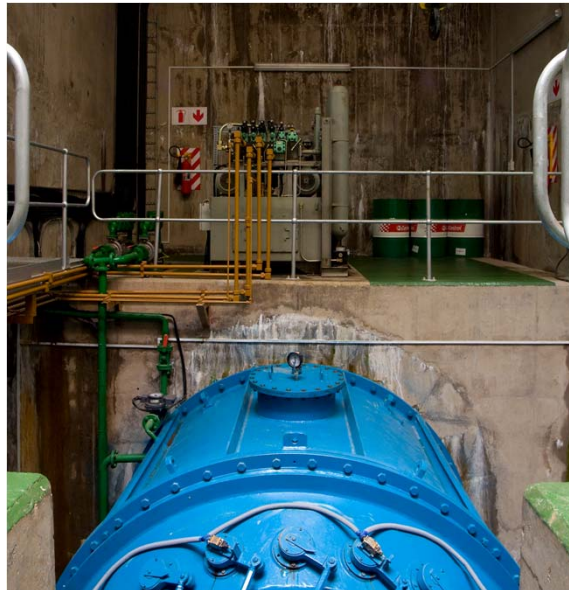
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Turbine Chamber

Wall at the back of the photograph is the inlet chamber

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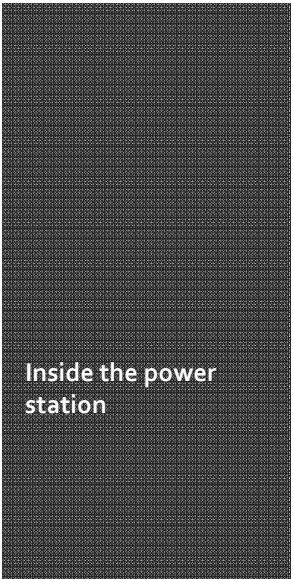


Double regulated horizontal axis Kaplan

3.1 m diameter
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Inside the power station



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Control Room



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Interconnection

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- Dihlabeng Municipality
- Panorama substation
- 11kV dedicated line



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Plant operation

- Semi-autonomous
 - 2 operators
 - 1 caretaker
- Operations contract: Revolution Energy
- NuPlanet: Administrative management

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BH milestones

- First commercial hydropower station implemented in South Africa in the last 22 years
- Obtaining the first water use license from the Department of Water Affairs under the Water Act (No 36 of 1998) for an Independent Power Producer
- Obtaining a generation license from the National Electricity Regulator of South Africa for operation as the first Independent Power Producer for hydropower
- One of the first 3 CDM projects in RSA
- Power Purchase Agreement with the Dihlabeng Local Municipality
- “Competing” on commercial terms with Eskom
- Kaplan turbines used in South Africa for the first time

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Challenges faced by Bethlehem Hydro

1. Industry Experience

- Engineers
- Consultants
- Operations and Maintenance
- Developers

2. Institutional Capacity

- First time departments were dealing with this type of project
- No investment into sector
- Low electricity prices



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Challenges faced by Bethlehem Hydro

3. Delays

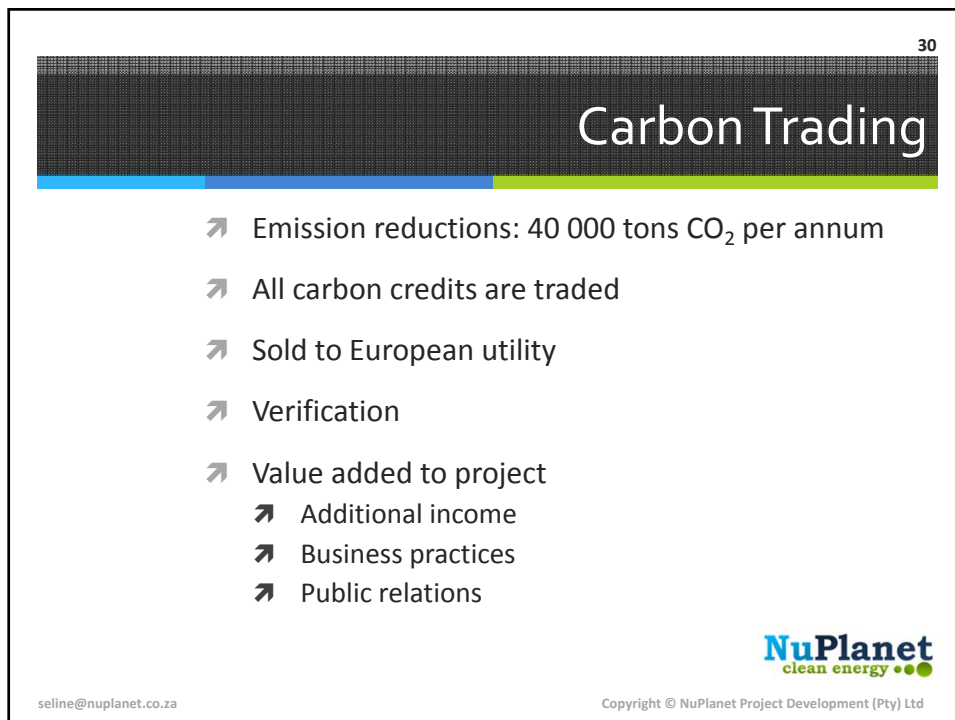
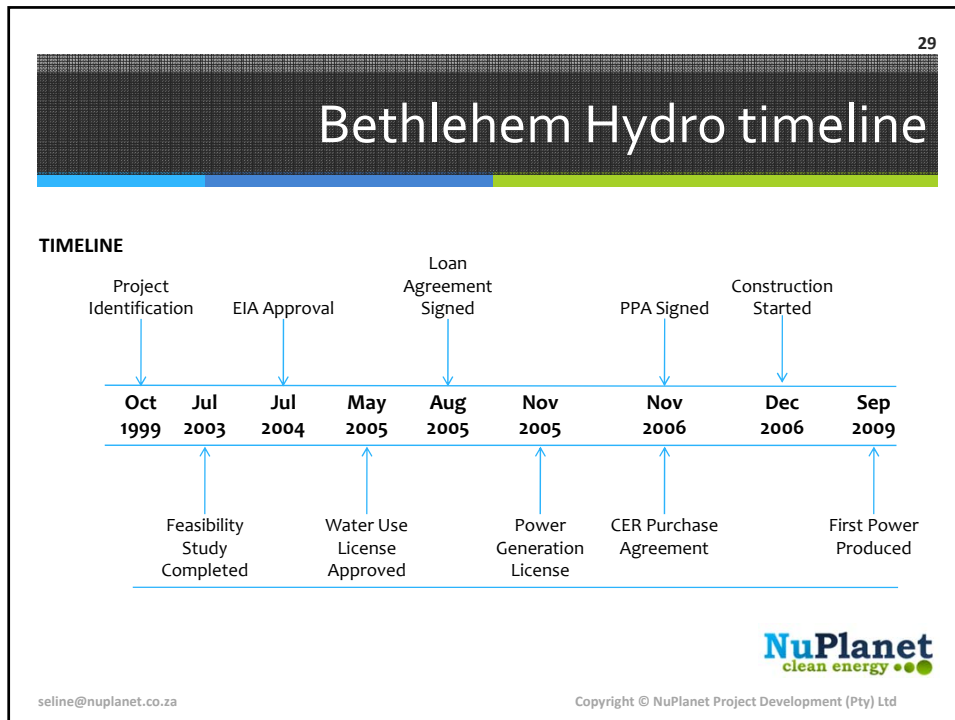
- Design changes:
 - Geotechnical
- Construction:
 - Initial : 18-24 m
 - Actual: 34 m
- Eskom:
 - Merino line delay

4. Cost overruns

- Doubling in cost in construction period:
 - Design changes
 - Interest during construction
 - Resizing of power stations
- BEE partner's late payment



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Awards

- “Best renewable energy project in Africa 2010”
- “Top 10 best small hydro projects in the world, 2009” - Africa Energy Awards
- “Energy project of the year, 2008” - International Water Power and Dam Construction
- “Green project of the year, 2006” - Development Bank of Southern Africa

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RSA hydropower market outlook

- Already developed:
 - 600 MW developed
- Possible additions:
 - Greenfield: 150 MW
 - Refurbishments: 60 MW
- Expected total in RSA: 810 MW
- More players

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Conclusion

- The industry was stagnant: project successful in the end
- BH opened the door for many new hydropower projects
- Given that the industry has evolved, players can make better decisions
- Lessons learnt increased NuPlanet's capacity to handle future projects

Thank you...

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www.bathalshemhydro.co.za

