

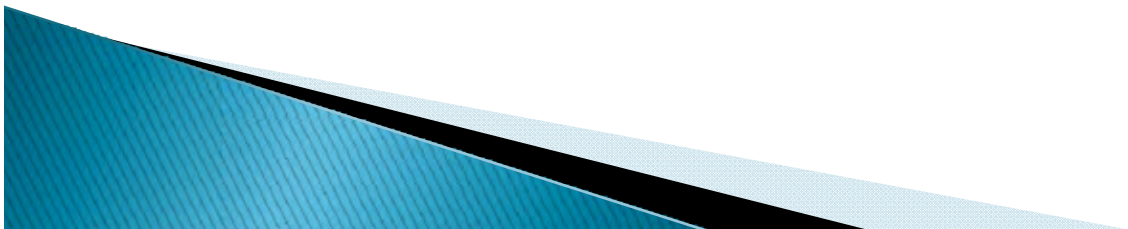
# *Funding Energy Efficiency Projects DSM Option*

*Dr F P Venter*

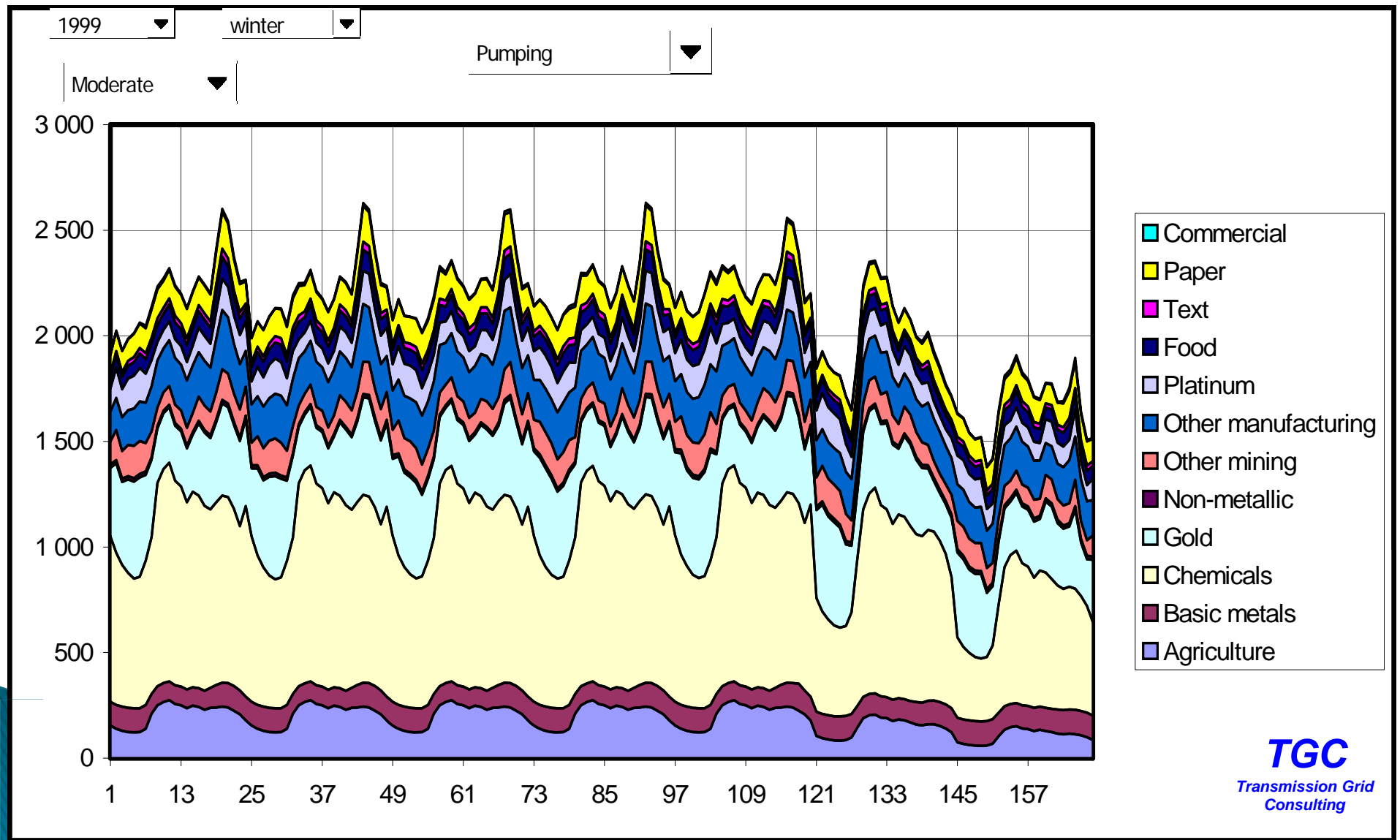
*Transmission Grid Consulting (PTY) Ltd  
Member: South African Association of Energy Services Companies*

# *Contents of the Presentation*

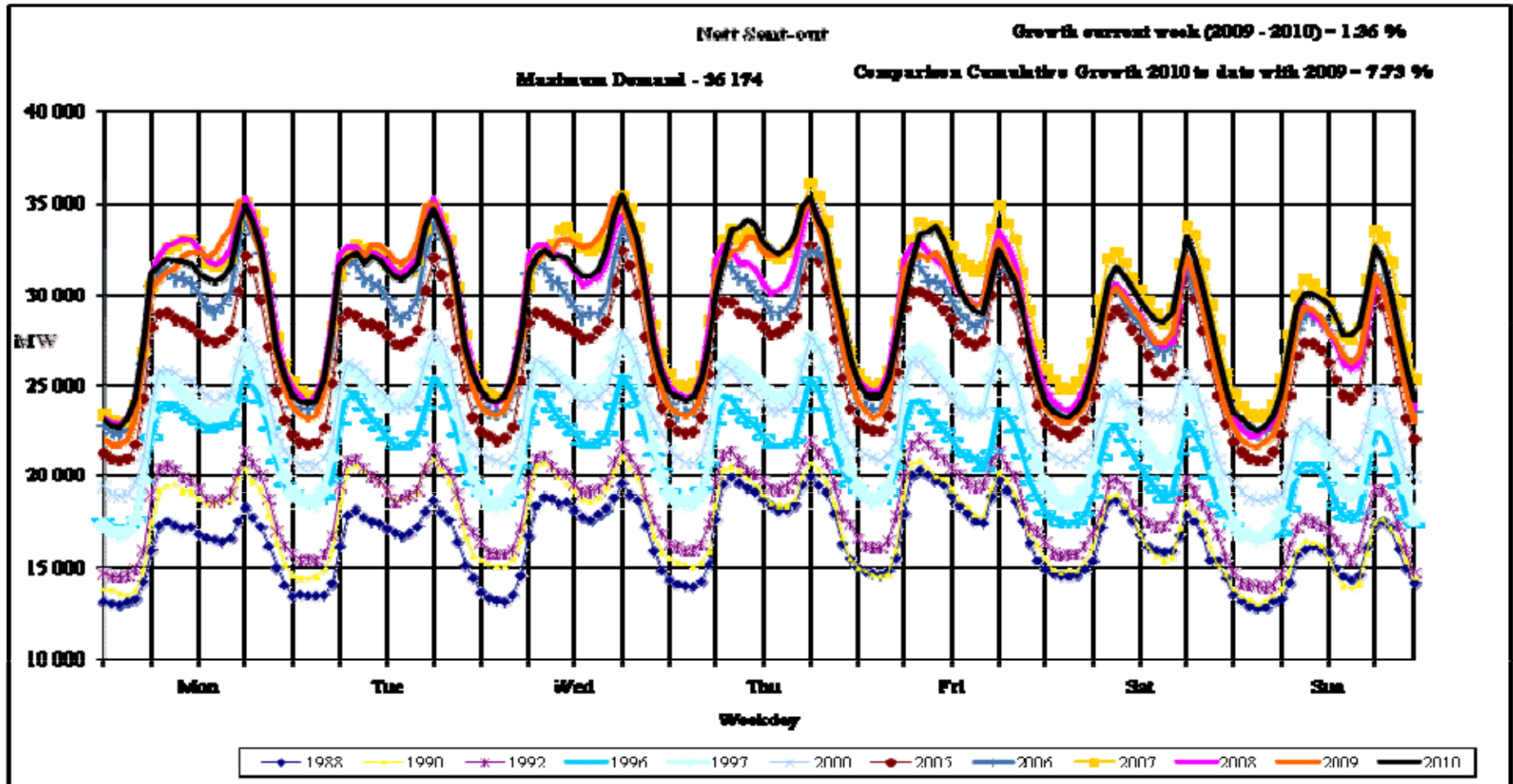
1. Agricultural Loads
2. Time Differentiated Tariff Structure
3. Cost of Energy
4. Purpose of the Intervention
5. Results - Commercial Farm
  - Irrigation Board
  - Water Users Association



# Total National Pumping Load

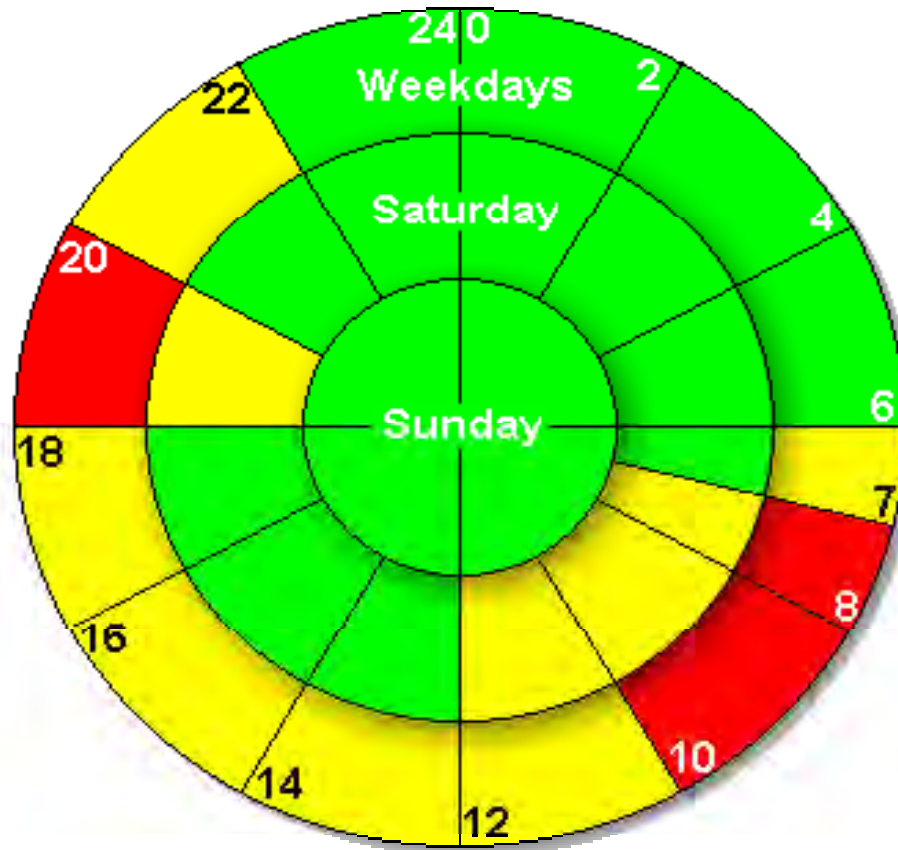


# Total National Pumping Load



# Time Differentiated Tariff Structure

## Ruraflex Tariff Time Zones



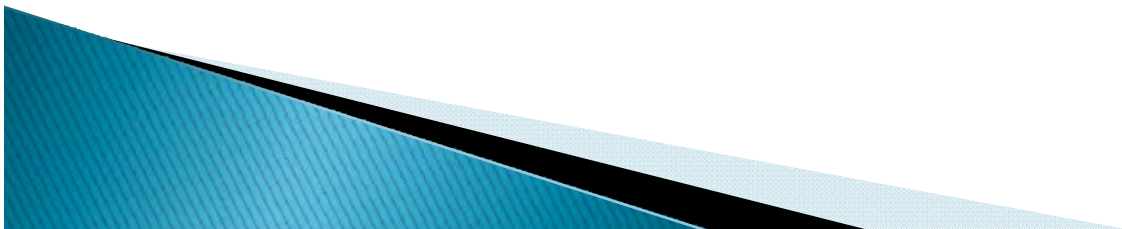
# *Cost of Energy*

## ***Low - demand season (September – May)***

<b>Peak</b>	<b>71.11 c/kWh</b>
<b>Standard</b>	<b>43.05 c/kWh</b>
<b>Off-peak</b>	<b>29.73 c/kWh</b>

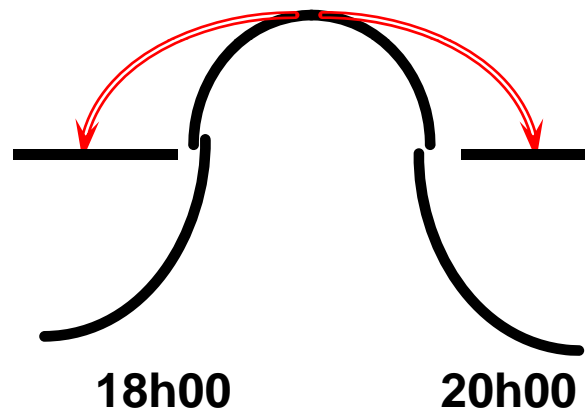
## ***High-demand season (June - August)***

<b>Peak</b>	<b>258.31 c/kWh</b>
<b>Standard</b>	<b>66.15 c/kWh</b>
<b>Off-peak</b>	<b>34.78 c/kWh</b>

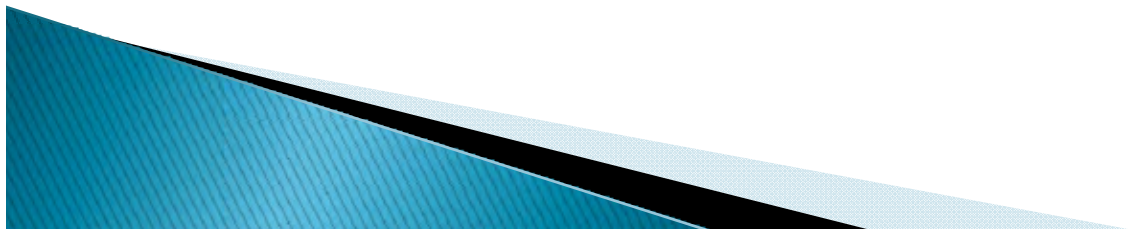


# *Purpose of the Intervention*

## Reduction of Load during Evening Peak Period



Schedule Operation out of the Peak Periods

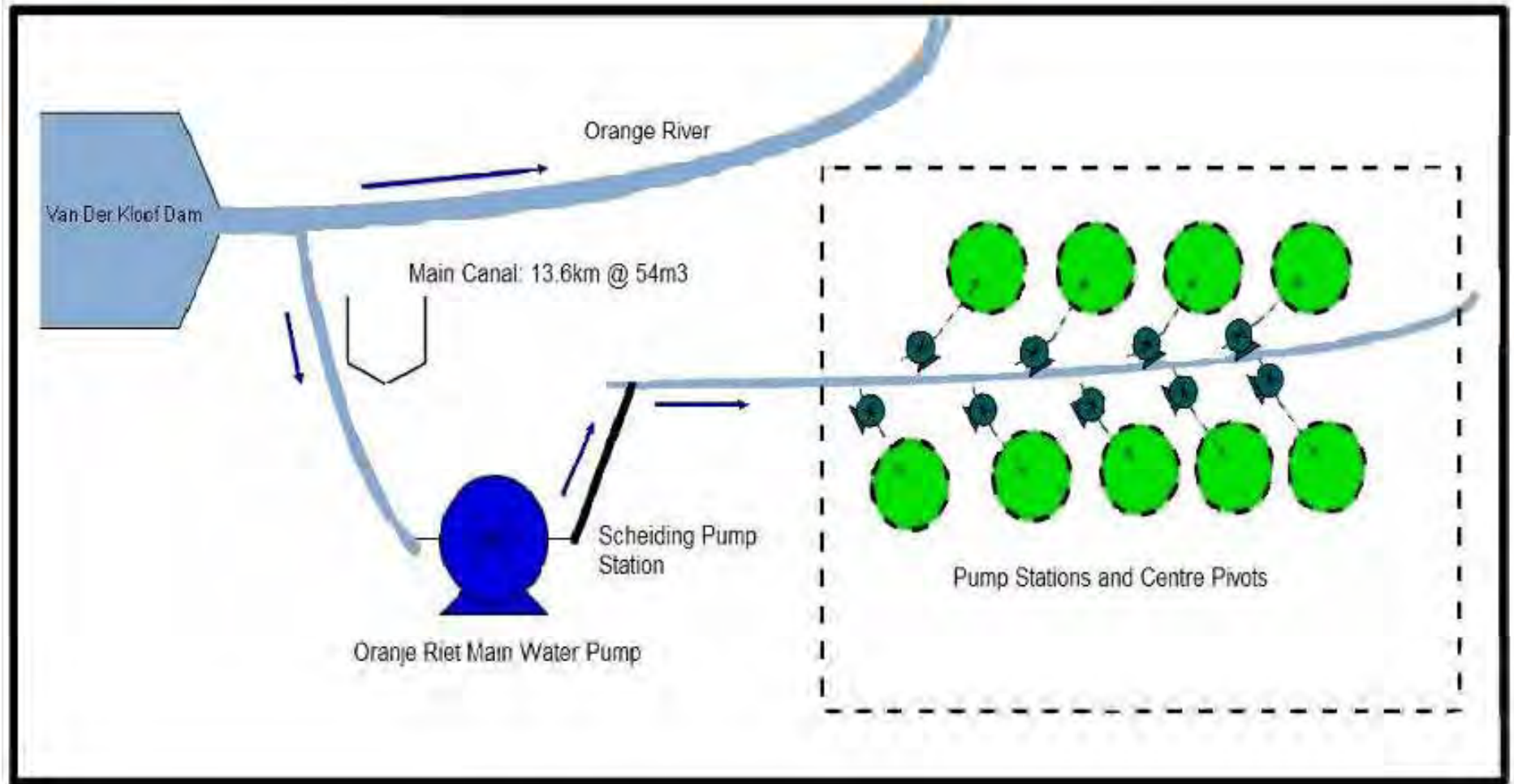


# Farming Operations

## J&V Agri

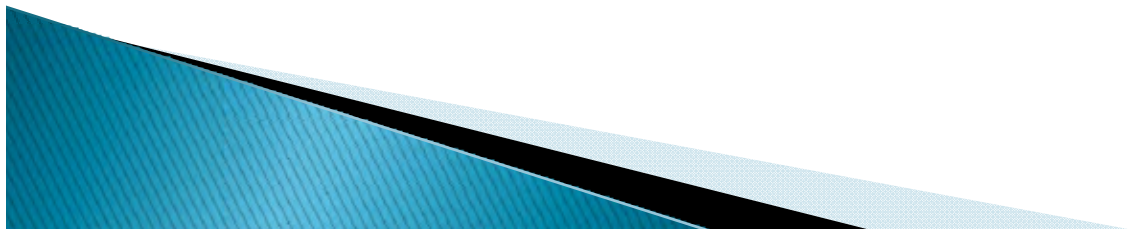
- ▶ Irrigation Area : 2400Ha
- ▶ Crops : Corn in Summer  
: Wheat in Winter
- ▶ Irrigation : 105 Centre Pivots
- ▶ Production : 30 kt/a

# Farming Operations

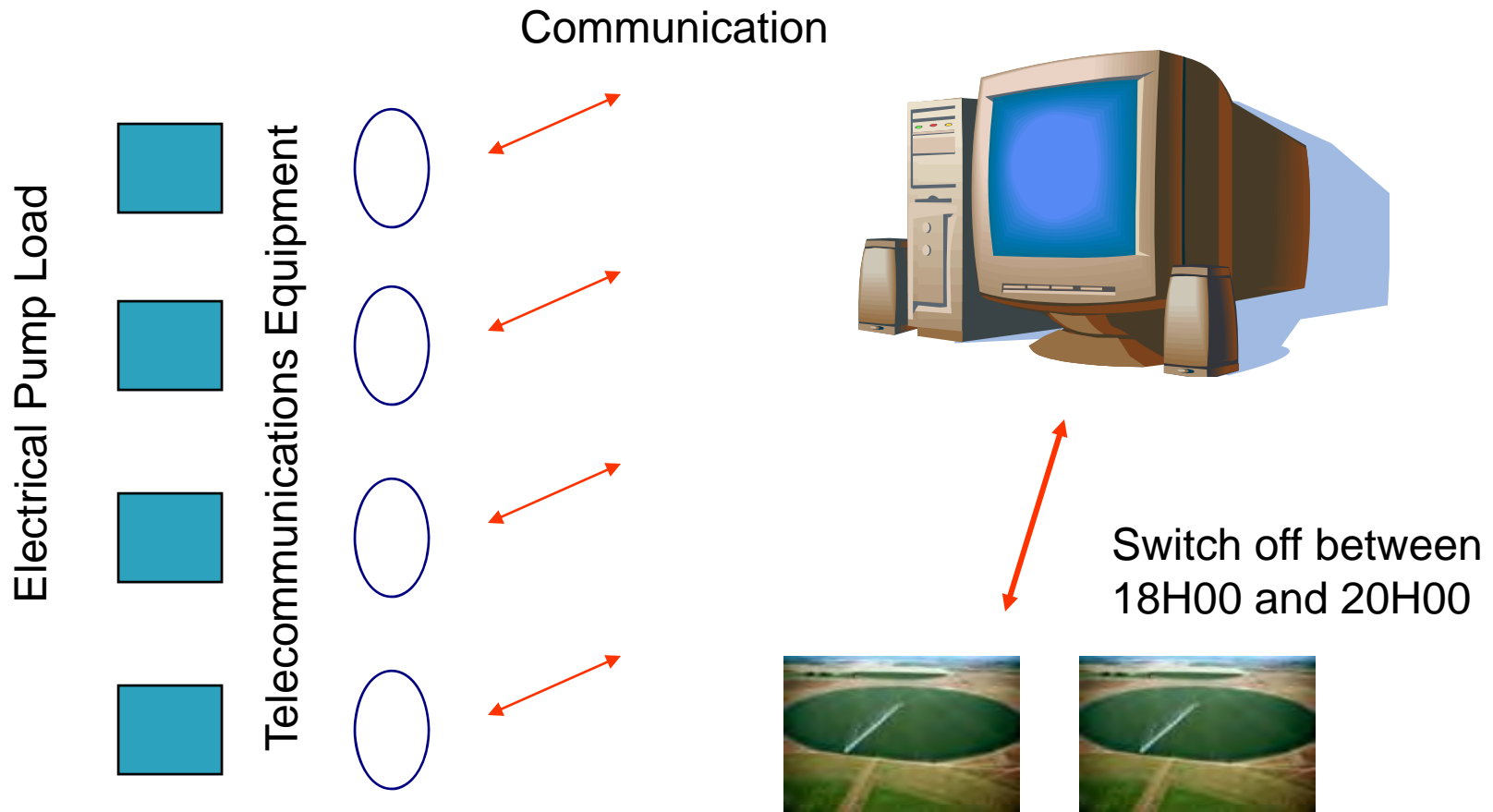


# Farming Operations

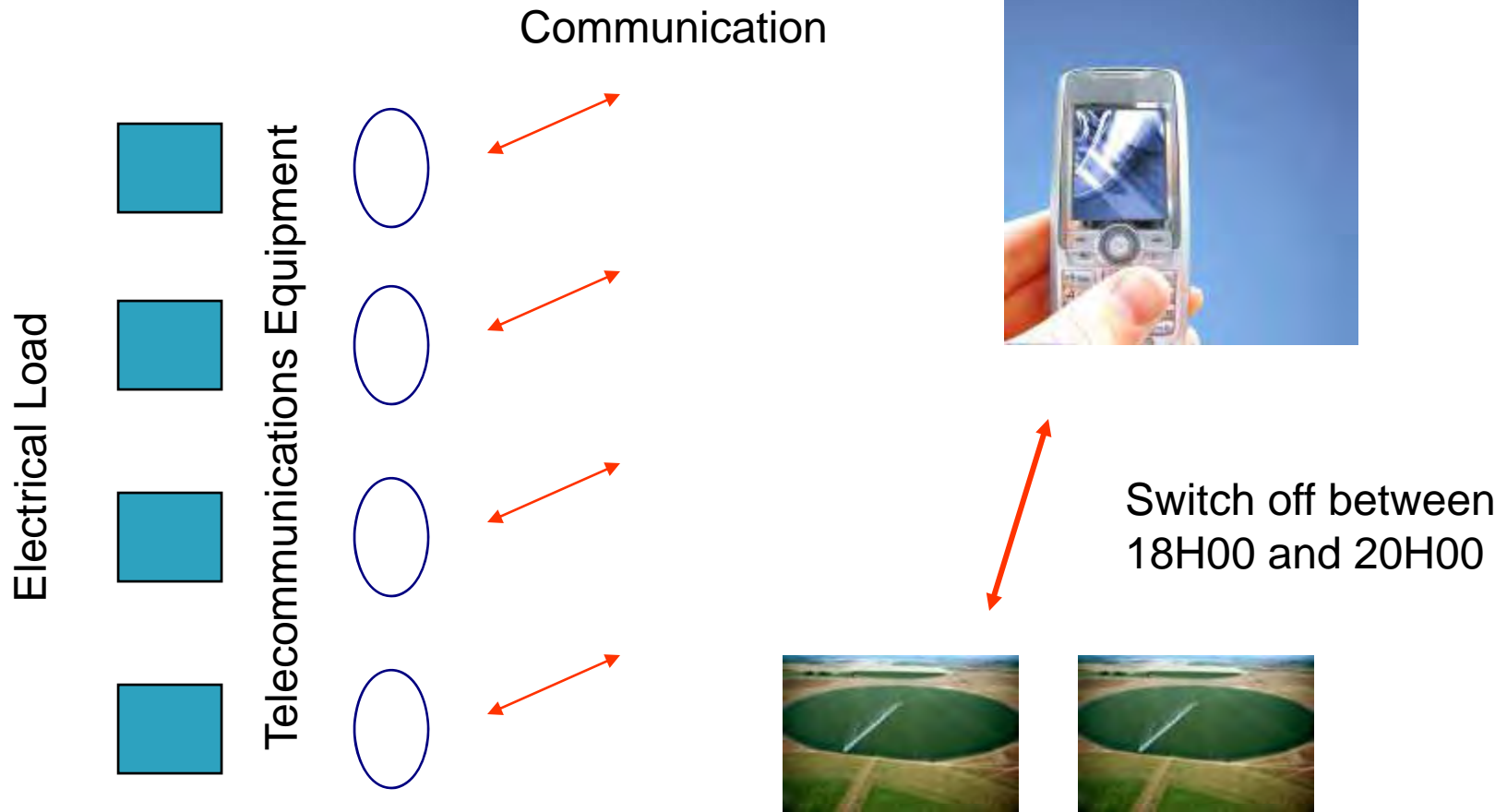
Canal / River  
Pump Stations



# Control System Layout - Automatic



# Control System Layout - Manual



# *Control Interface*



# Telecommunications and Control



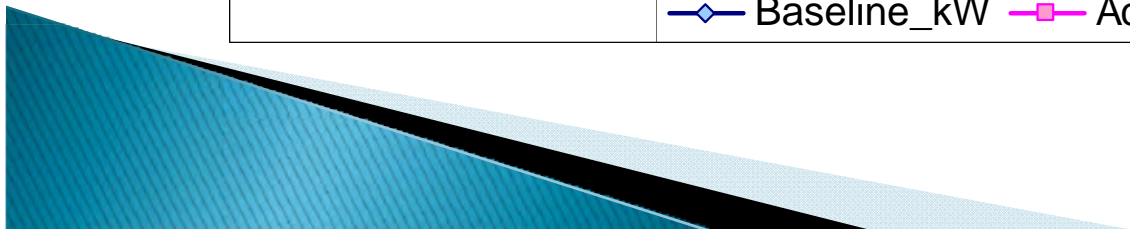
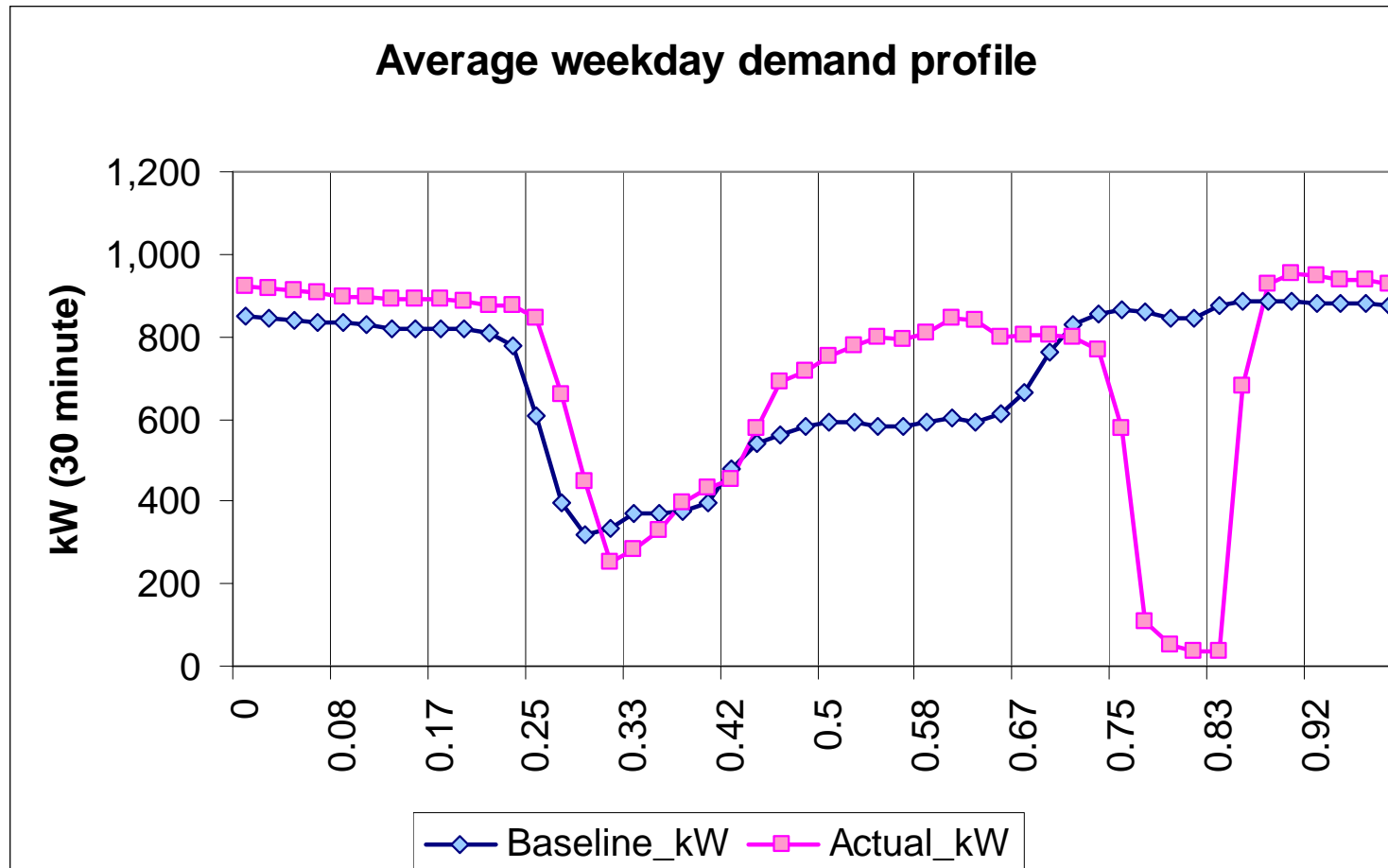
# Telecommunications and Control



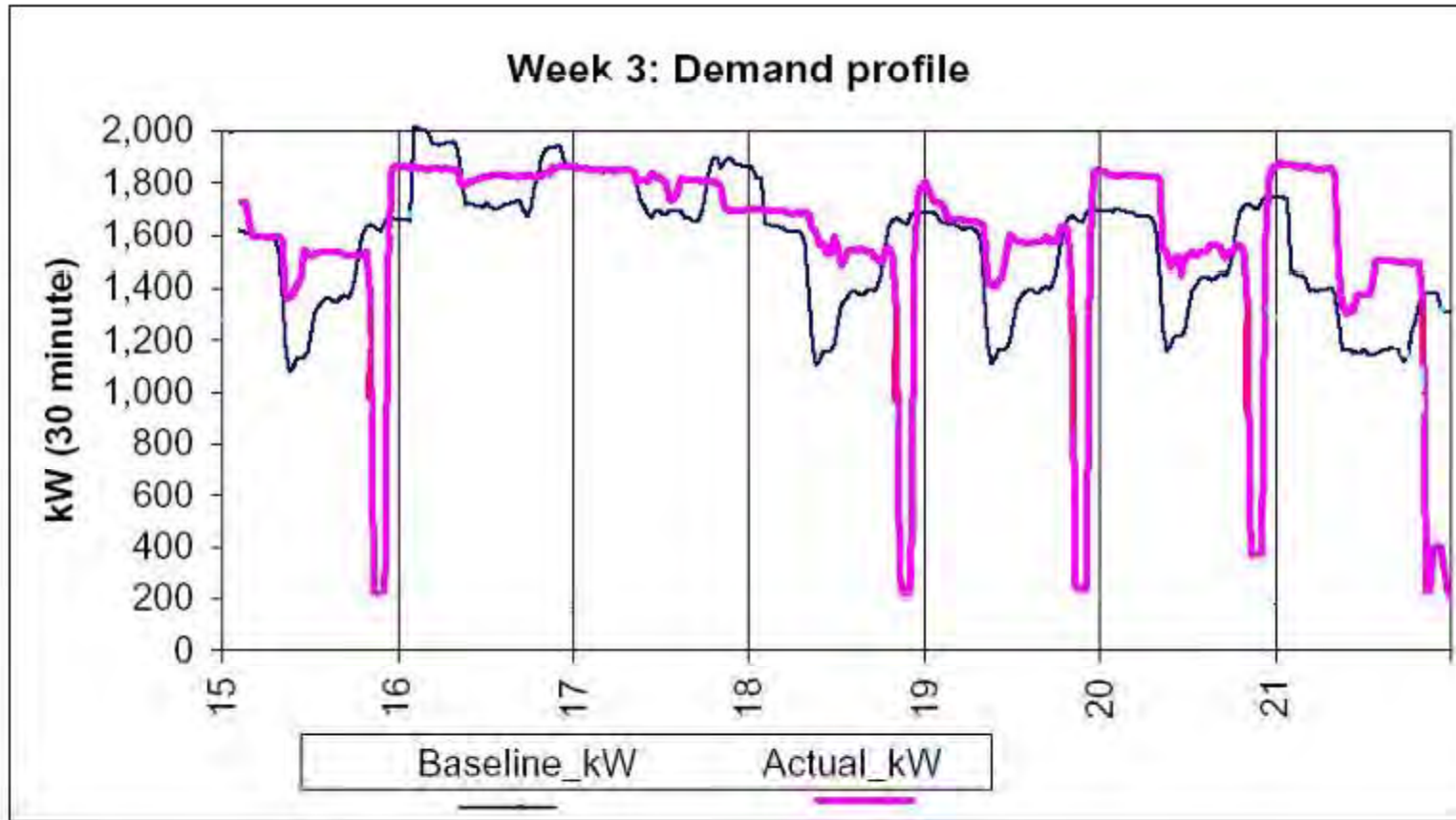
# Pressure Control



# Result of the Intervention

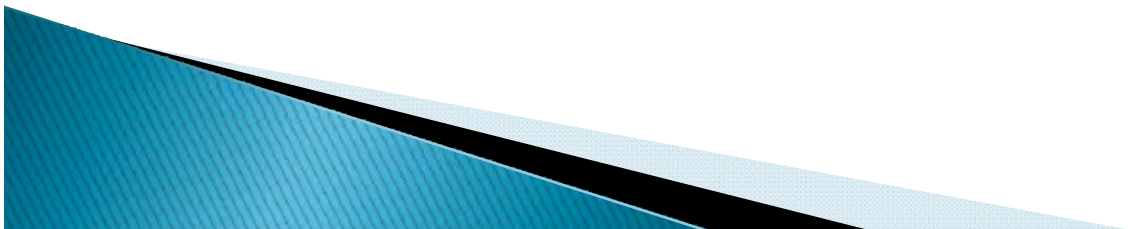


# Result of the Intervention - Farming Operations



# Conclusion – Farming Operations

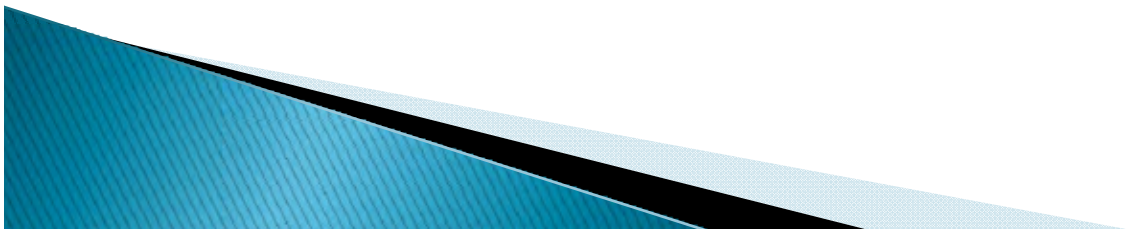
- ▶ 105 Centre Pivots Fully Controllable
- ▶ First Technology Application in this Field
- ▶ Automatic or Manual Scheduling
- ▶ 880kW moved out of Peak Period
- ▶ Operations remain Energy Neutral
- ▶ Save R378 000.00 per annum on Energy Costs
- ▶ Savings on fuel, manpower, vehicles



## ***Extraction Control – IB Level***

### ***Chapter 4 of the National Water Act No: 36 of 1998.***

“Water work(s) must be equipped by the licensee at his own cost with approved self registering water meters .....



# Water Measurement



# Extraction Monitoring – Association Level

Electrical Pump Load



Start & Stop up to 4 Pumps Automatically via sms & Receive Feedback



Irrigation Pumps Automatically Switch Off Between 18H00 and 20H00



Access To Website to View Water Usage

# *Pressure Control*



# *Telecommunications and Control*



# Control Interface

De Kaap - Windows Internet Explorer

http://196.211.105.137/dekaap/select\_admin\_sites

ALL SITES

Home  
Logout

Site Information

All Site Information  
Site Search

Legal Entities  
Sites  
Units  
Users

Login Profiles

Unit Info Requests  
Unit Settings  
Unit Sessions

App Admin  
Delete Site Data  
User Events

Alarms & Events Counter Logs Status Water Usage Reports

Select All Toggle selection Unselect All

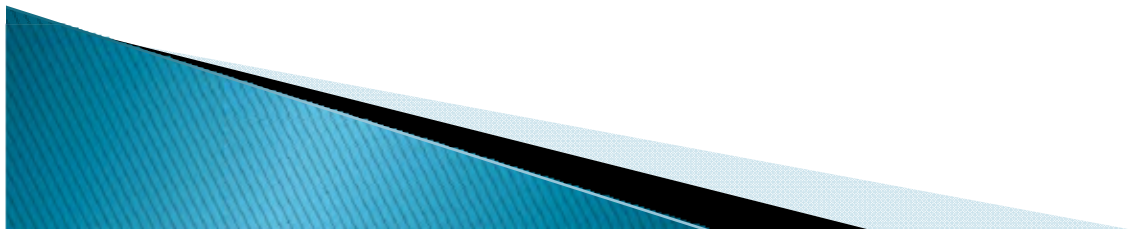
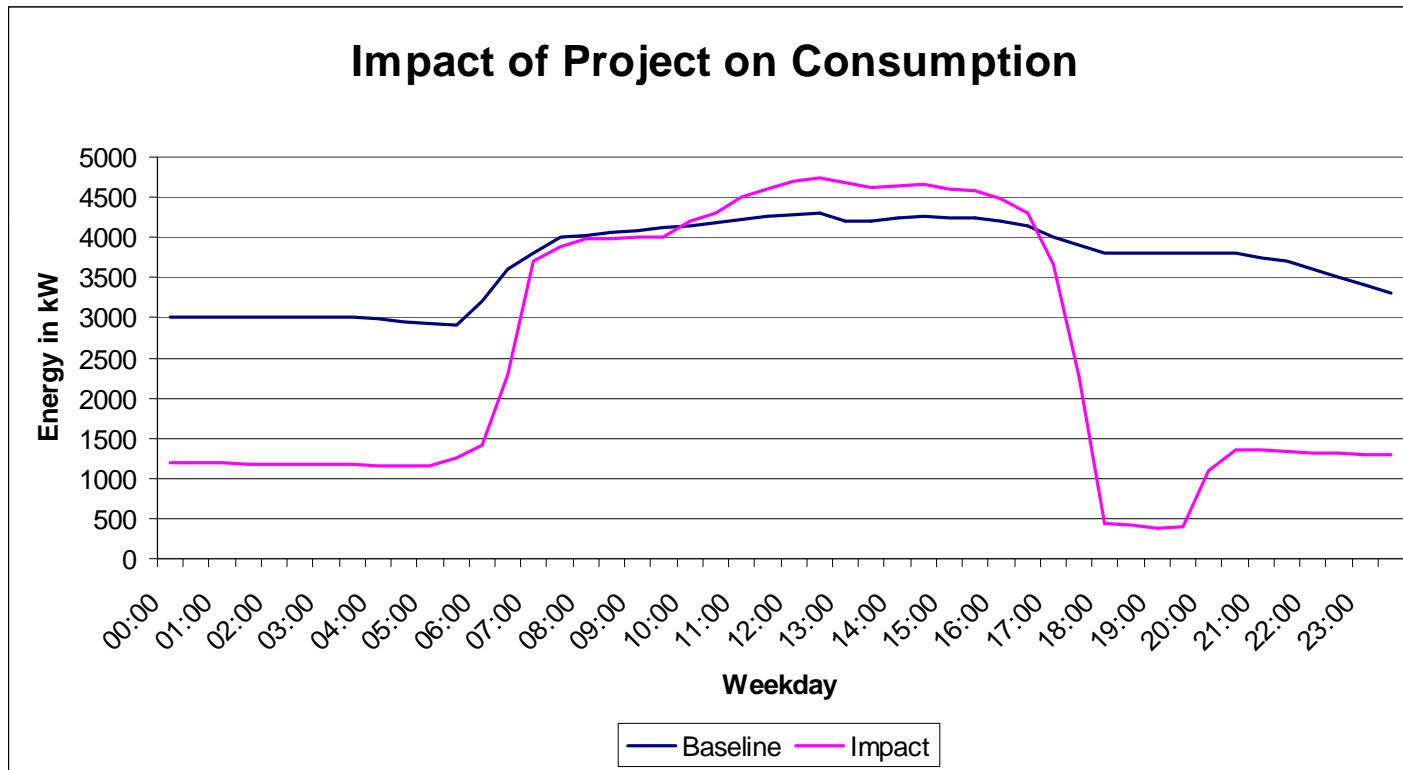
Sort By: ID Get Selection

Select	ID	Number	Full Name	Name	Unit Number	Output	Input	GPS Coordinates
<input type="checkbox"/>	1	aR Site 1-1	Alex Rawstome	AR Site 1-1 Name	9999	Relay 1	Digital 1	AR's Test Unit
<input type="checkbox"/>	2	AR Site 2-2	Alex Rawstome	AR Site 2-2 Name	9999	Relay 2	Digital 2	AR's Test Unit
<input type="checkbox"/>	7	Qu04a	Deon Du Plessis	River 75kW	7	Relay 1	Digital 1	S25 45.812 E030 58.297
<input type="checkbox"/>	8	Qu04b	Deon Du Plessis	River 90kW	24	Relay 1	Digital 1	S25 45.804 E030 58.317
<input type="checkbox"/>	9	Qu04e	Deon Du Plessis	Castle Dam 45kW	10	Relay 1	Digital 1	S25 44.840 E030 57.837
<input type="checkbox"/>	10	Qu04f	Deon Du Plessis	Borehole 37kW	23	Relay 1	Digital 1	S25 45.715 E030 58.188
<input type="checkbox"/>	11	Qu04c	Deon Du Plessis	Dam 15kW	100051	Relay 1	Digital 1	S25 45.375 E030 57.895
<input type="checkbox"/>	12	Qu04d	Deon Du Plessis	Dam 55kW	52	Relay 1	Digital 1	S25 45.375 E030 57.895
<input checked="" type="checkbox"/>	14	Qu18a	Warren Heame	Canal 30kW	25	Relay 1	Digital 1	S25 48.642 E031 00.517
<input type="checkbox"/>	15	Qu18b	Warren Heame	Canal 11kW	25	Relay 2	Digital 2	S25 48.642 E031 00.517
<input type="checkbox"/>	16	Qu16	J D Breadt	River 18.5kW	27	Relay 1	Digital 1	S25 44.858 E030 59.813

Done

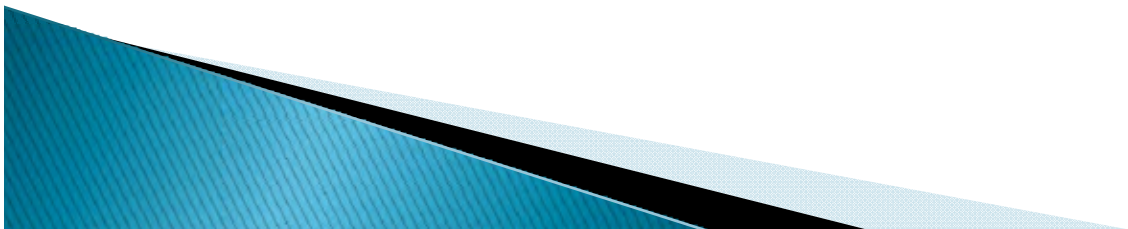
Internet

# Water Extraction Monitoring



# Conclusion – IB Level

- ▶ Complies with new Water Act
- ▶ Water extraction monitoring is centralised
- ▶ Volumes recorded
- ▶ Saving of R1.9 mil per annum on energy cost
- ▶ Savings on fuel, manpower, vehicles

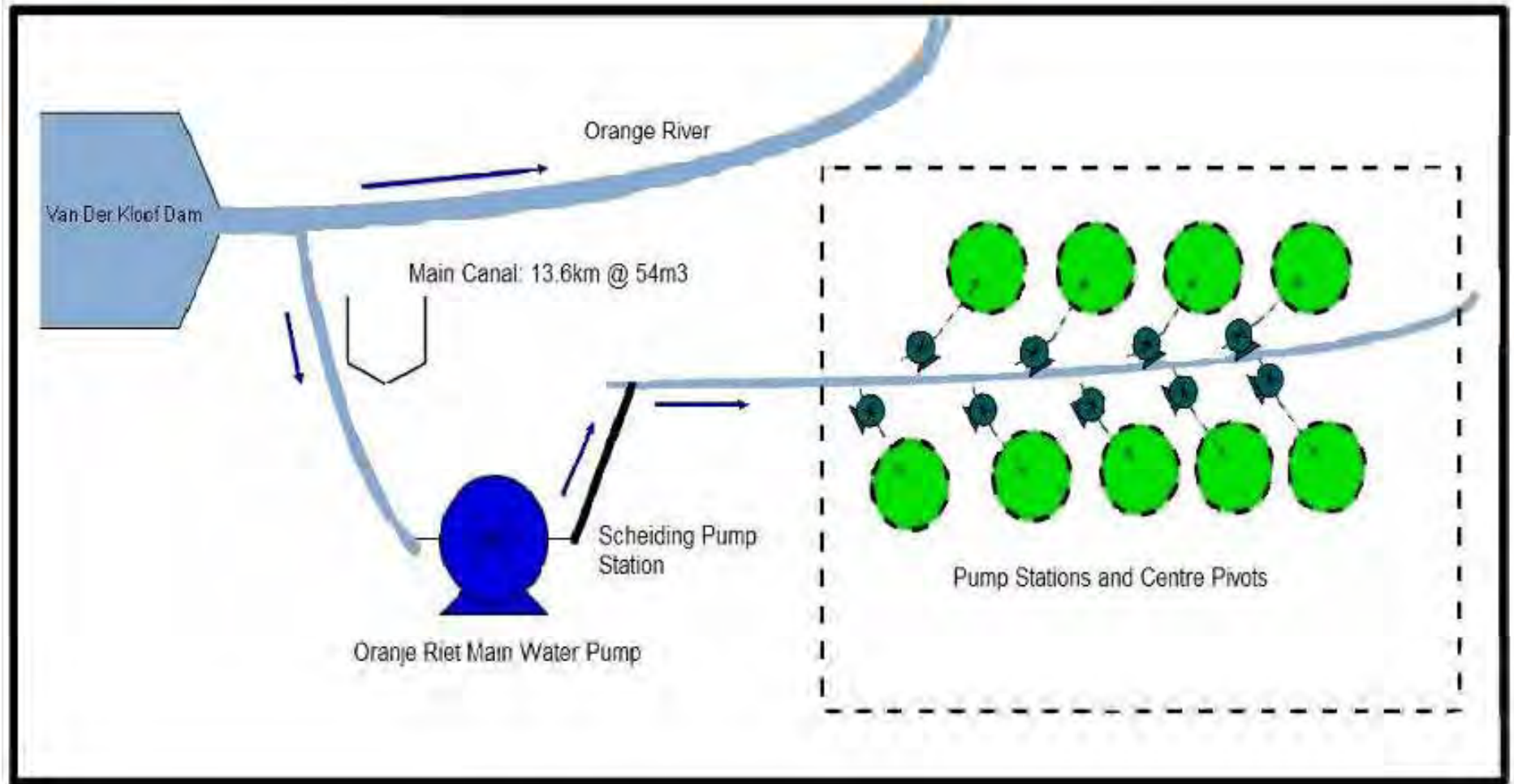


# Water Users Association

## OranjeRiet WAU

- ▶ Main canal: 13.6km with a capacity of 54 m<sup>3</sup>/s
- ▶ Pump station: 7 pumps ranging from 650kW to 2000kW electric motors, with the following capacities:
  - 1 \* 1 m<sup>3</sup>/s
  - 1 \* 2 m<sup>3</sup>/s
  - 5 \* 3 m<sup>3</sup>/s
- ▶ Pipe-line to canal: 2 \* 1.8m diameter, 900m pipeline with a 47m head.
- ▶ Oranjeriet canal: 112km with a capacity of 15.2 m<sup>3</sup>/s and 13.2 m<sup>3</sup>/s.
- ▶ A balancing dam with a capacity of 1 450 000 m<sup>3</sup>
- ▶ Rietriver canal system: 185km canal with 54km of drainage canals, 103.4km river with 2 weirs and 5 balancing dams with a capacity of 2 300 000 m<sup>3</sup>.

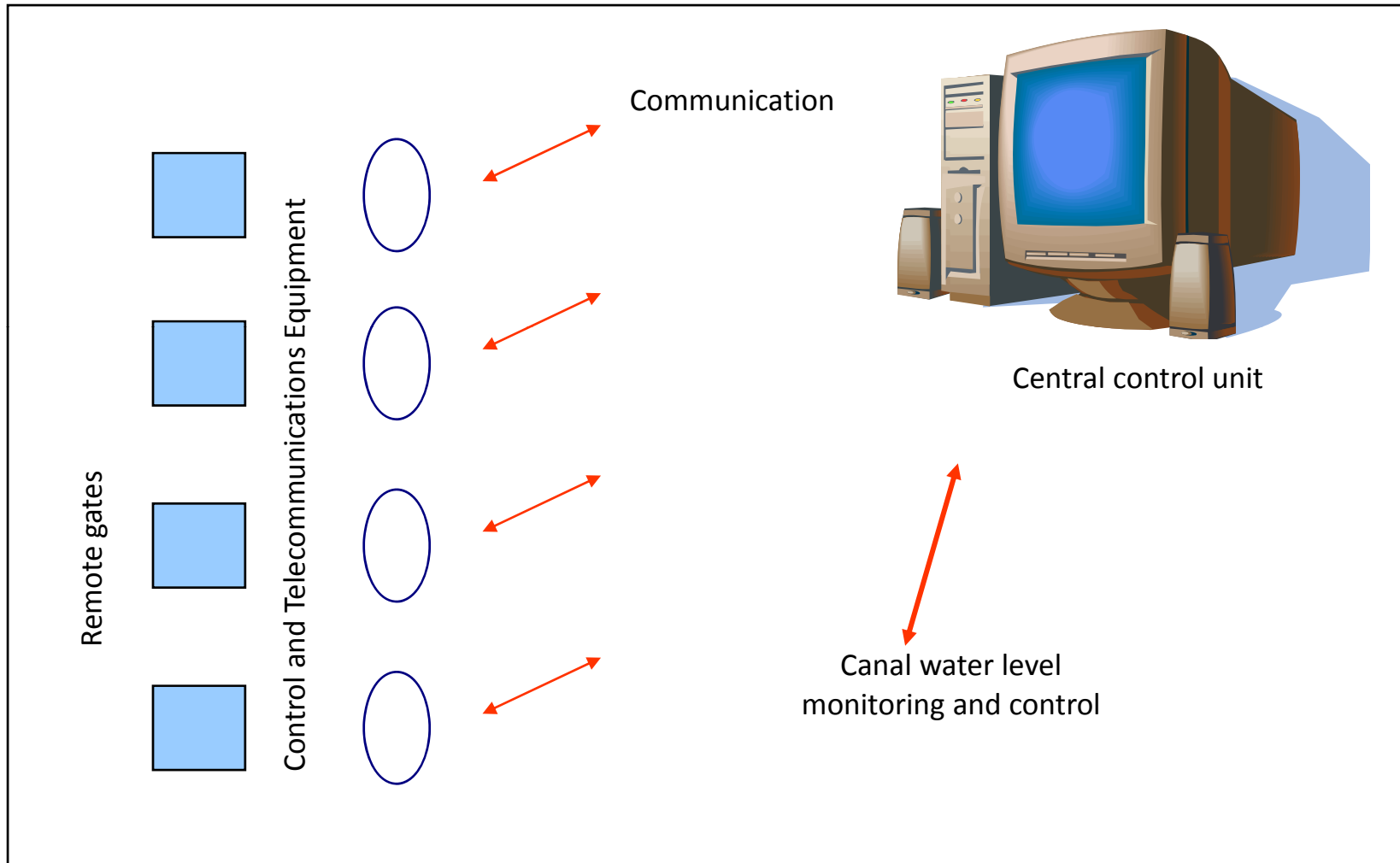
# Extraction Works



# Scheiding Pump Station



# Conceptual Control Layout



# *Automatic Gate Control*



# Control Weir Parameters



1. R3 Level and Flow	
Water Level	%3.31 m
Working Flow Rate	%3.31 m <sup>3</sup> /s
Working Flow Rate	%5.01 m <sup>3</sup> /h

2. DAM Level	
Water Level	%3.31 m

General Trend
Level, Flow and Valve Trend
Set Flow Parameters

Hk Balanseerdam Uitlaat

**pro design** RTU 23

**Last Update Time**  
2005/04/20 14:30:00

**Next Poll**  
14:30:00

Busy

Failed

Blocked

Enable/Disable

Poll

---

**Battery:** 00.00 V

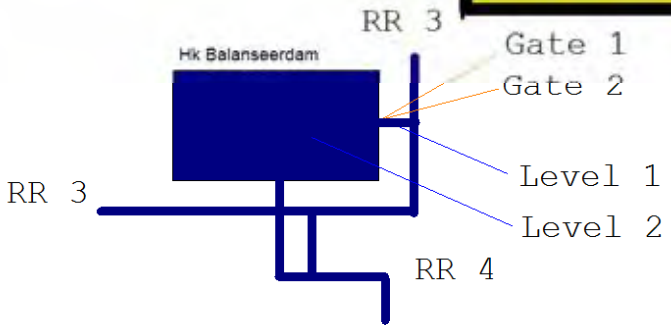
**24v:** 00.00 V

Alarm Failed

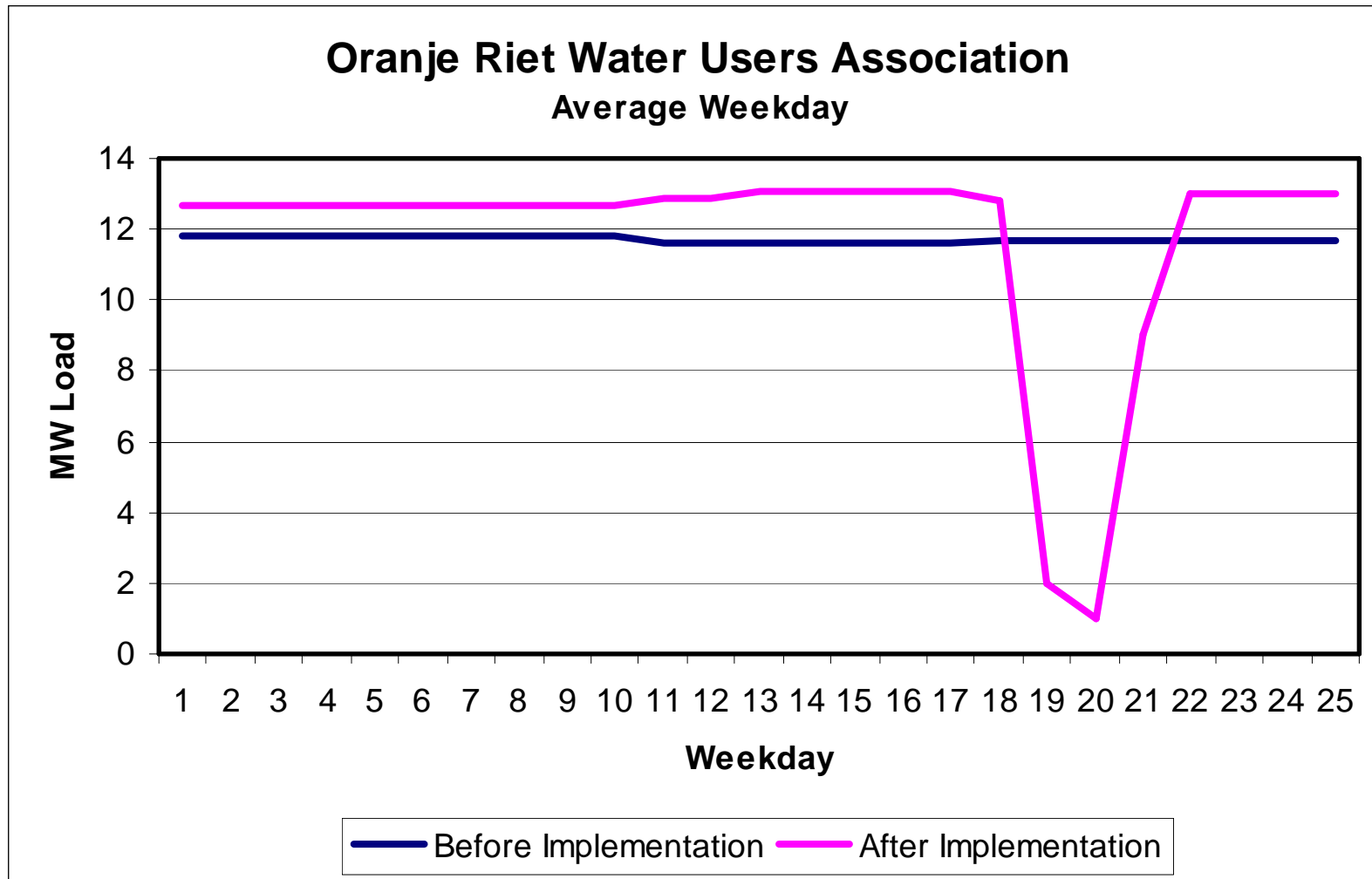
Hot Tamper

Bus Tamper

Gate 1	Gate 2
%Open	%Open
Auto	Auto
Fault	Fault
Setpoint Required	Setpoint Required
Not Opened	Not Opened
Not Closed	Not Closed
Reset Controller	Reset Controller



# Result of the Intervention



# Conclusion – WUA Operations

1. Special tariff, little cost savings
2. Saving in operational expenses in terms of manpower, transport and fuel costs.
3. The farmers need to contribute less to the operational expenses, realizing a saving for all.
4. Water control and scheduling is centralized.
5. Load management of 9.95 MW in the evening peak
6. To date, the project remains the first and only application of these technologies in this field.

# Questions



Dr Frik Venter  
Transmission Grid Consulting  
Tel: 011 396 4502 / 082 780 9993  
Email: [friktgc@iafrica.com](mailto:friktgc@iafrica.com)