



# Energy Efficiency

Smart Power Optimizer (SmartPO)

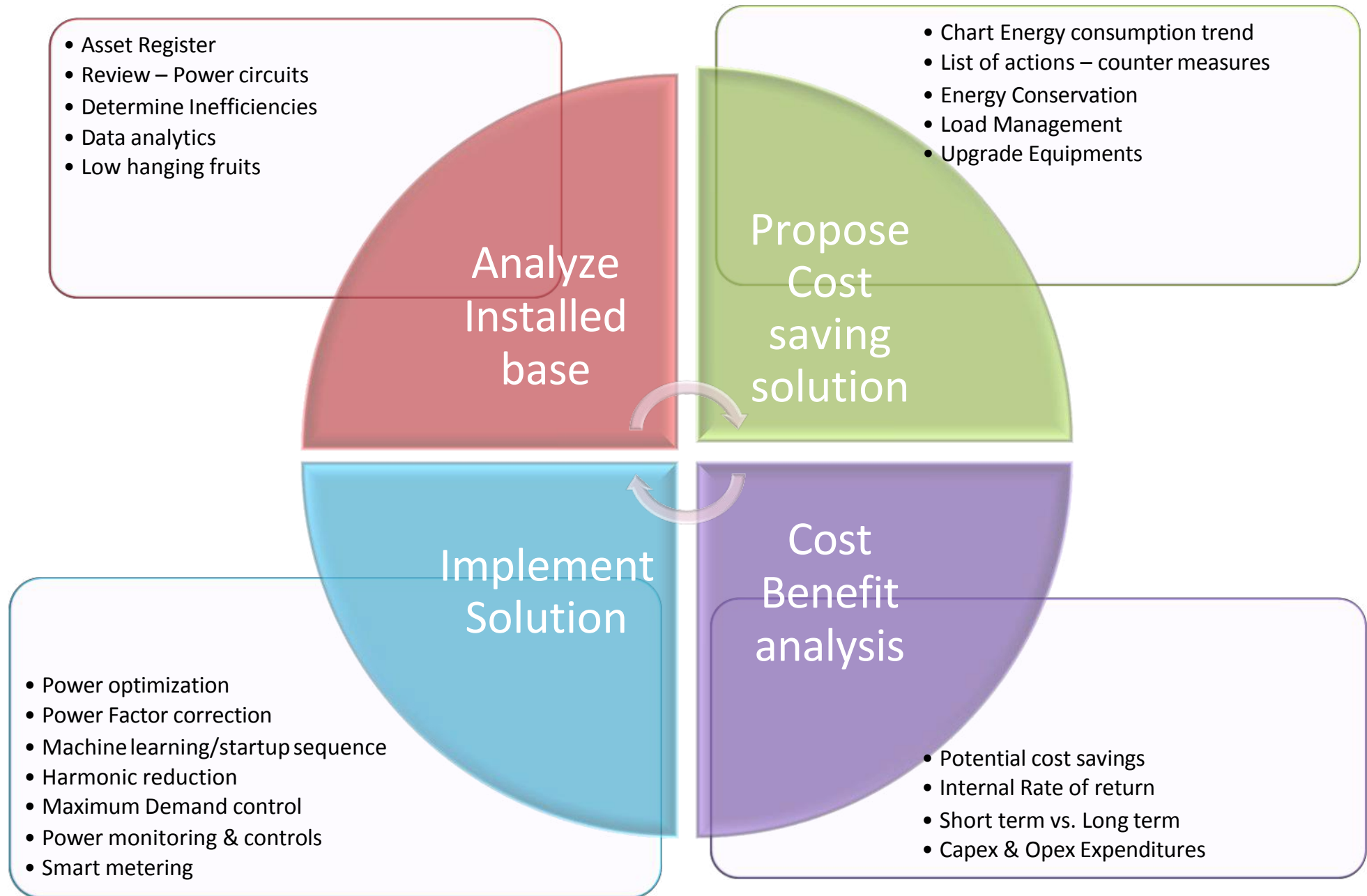
# Profile -

An Energy efficiency Technology wing of Ino-Solar could consult, design, automate and manufacture to utilize energy optimization techniques there by operating and saving energy for various sectors including Industries, Mines, Power Plants, Substations, Commercial & Residential buildings.

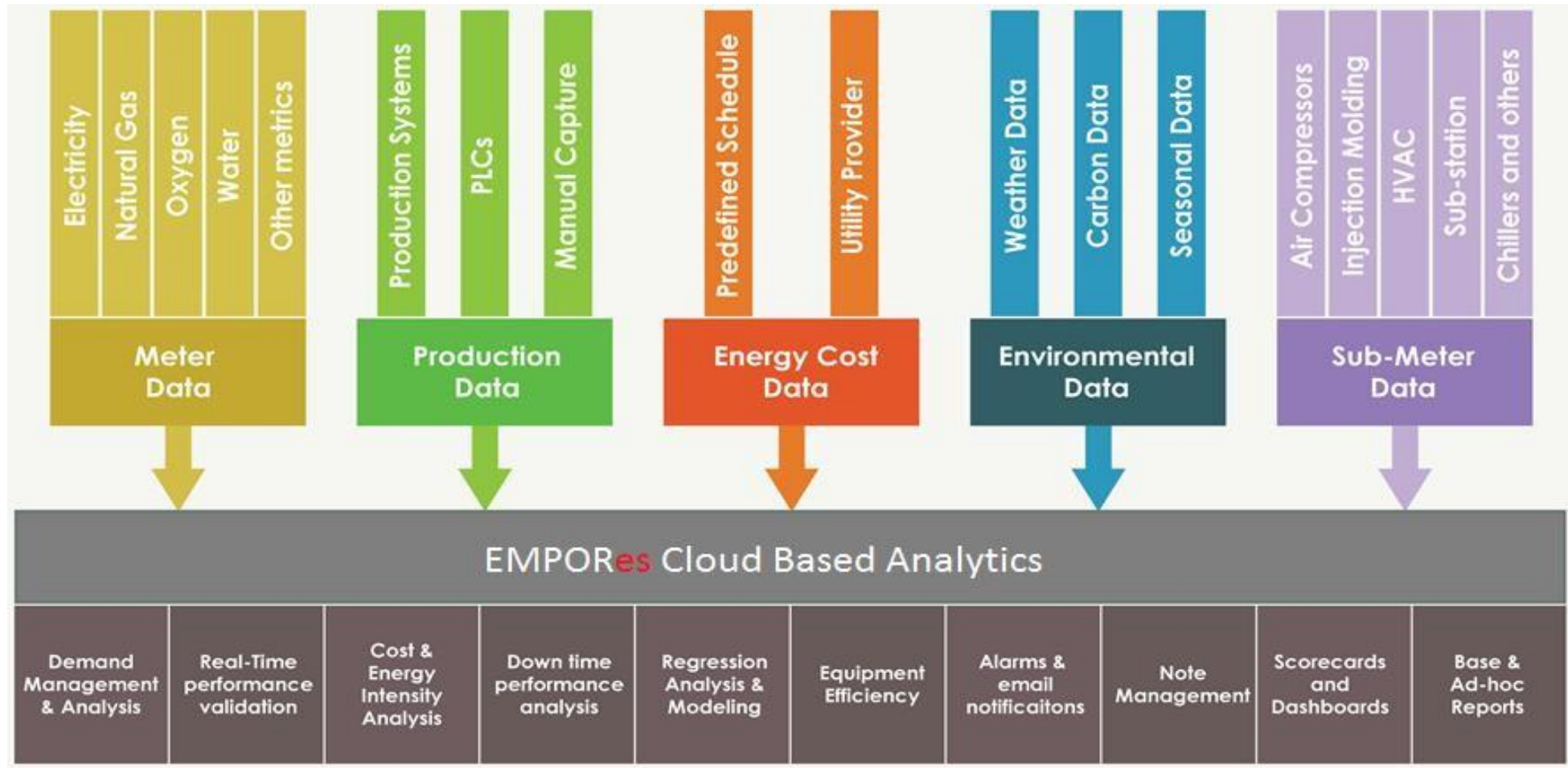
The main aim is to focus on optimizing Energy losses and resolving the issues of weak power transmissions to create a better solution in Energy Efficiency platform

We are dedicated to the research of Electrical Efficiency, suppression of Energy losses & improve Energy savings

# Approach - for Solution Implementation



# Cloud Based Data Profiling and Mining Solution



- Ω Direct Labor Efficiency
- Ω Operating Equipment Effectiveness (OEE)
- Ω Safety Management
- Ω Enterprise Sustainability Performance Management (ESPM) or Carbon Accounting
- Ω BI visualization from Associates in the plant
- Ω 5s Audits
- Ω Behavior Based Safety (Risk Assessment)
- Ω Energy Management

# Impact on Direct Billing

Confidential Industrial Client in South Africa				
Charge	Measured	Rate	Total	
KWh	41112.482	R 0.75	R 30,941.25	
KVA	335.008	R 136.63	R 45,772.14	
Network Access	1	R 402.71	R 402.71	
Basic	1	R 805.35	R 805.35	
Total Energy Cost ® Excl VAT			R 77,921.46	
VAT			R 10,909.00	
Total Energy Cost ® Incl VAT			R 88,830.46	

Demand charges works out 45% of total charges

## Energy Optimization & Cost impact

- KVA reduction through Power Optimization will bring down demand charges
- Dynamic intelligent Power factor correction will eliminate penalty charges
- Kwh reduction through Voltage Optimization will impact on direct billing
- Harmonic filtration will reduce the maintenance & replacement cost of the Equipment

# Energy Efficiency(EE) in industries



- ✓ Potential to save up to 53% in industrial sector
- ✓ 3 Primary Methods – Energy Conservation, Energy Efficiency and Alternate Energy

## Energy conservation



- ✓ Demand control – Peak, Idle, Average
- ✓ Load Management – Schedule, shedding
- ✓ Supply voltage optimization, PF control
- ✓ Monitoring & Metering

## Energy efficiency



- ✓ Standard motors vs. energy efficient motors
- ✓ Variable speed drives, Soft starters, Power Optimizer
- ✓ Efficient transformers, Maximize pump/Fans operation
- ✓ Intelligent lighting control
- ✓ Optimize Air conditioning, enhance compressor air flow

## Alternative Energy

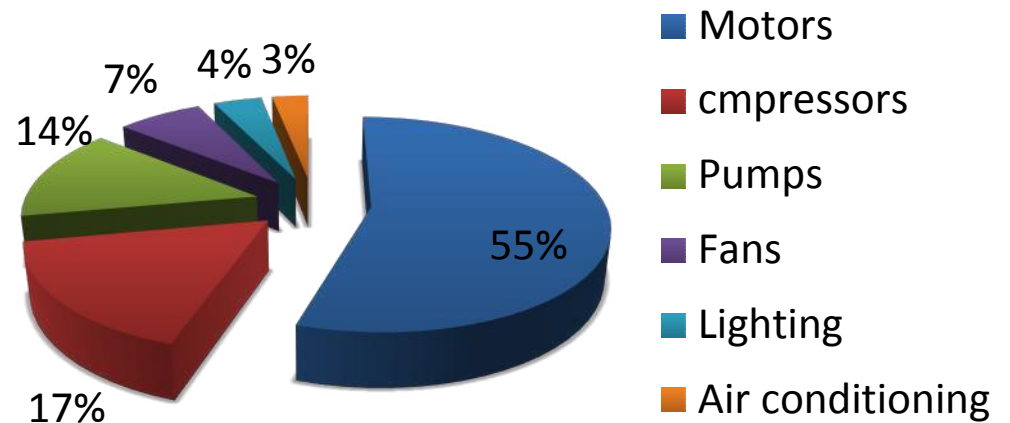


- ✓ Captive Generation-DG, Coal, Bio-mass
- ✓ Renewable energy / Hybrid energy – Solar, Wind
- ✓ Power backup-UPS, Inverters
- ✓ Heat recovery

# Energy consumption in industries

## Major energy consumption due to

- ✓ Demand mismatch
- ✓ Poor Operational efficiencies
- ✓ Motors, Fans & compressors
- ✓ Inefficiency in Sub distribution
- ✓ No proper metering & monitoring



## Short term Energy savings

- ✓ Optimum Load schedule
- ✓ Basic smart metering/panel level
- ✓ Load schedule/shedding
- ✓ Avoid no load/low load operations
- ✓ Plug leakages

## Long term Energy saving

- ✓ Improve metering, monitoring, logging & controls
- ✓ PF correction & Automation, Harmonic filtration, Dynamic Power optimization
- ✓ Equipotential bonding for major Equipments to plug leakages



# Low Tension Power Optimizer 2KVA – 3MVA



Capacitors

AI based controller with  
Machine learning

Automatic switching  
with zero crossing

Impedance matching auto  
transformers

## System functionality:

- ✓ Automatic transformer tap changing based on Load pattern
- ✓ Advanced machine learning to identify the load parameters
- ✓ Remote load monitoring, scheduling and control
- ✓ Remote configuration capability
- ✓ Automated demand response capability based on smart tariff

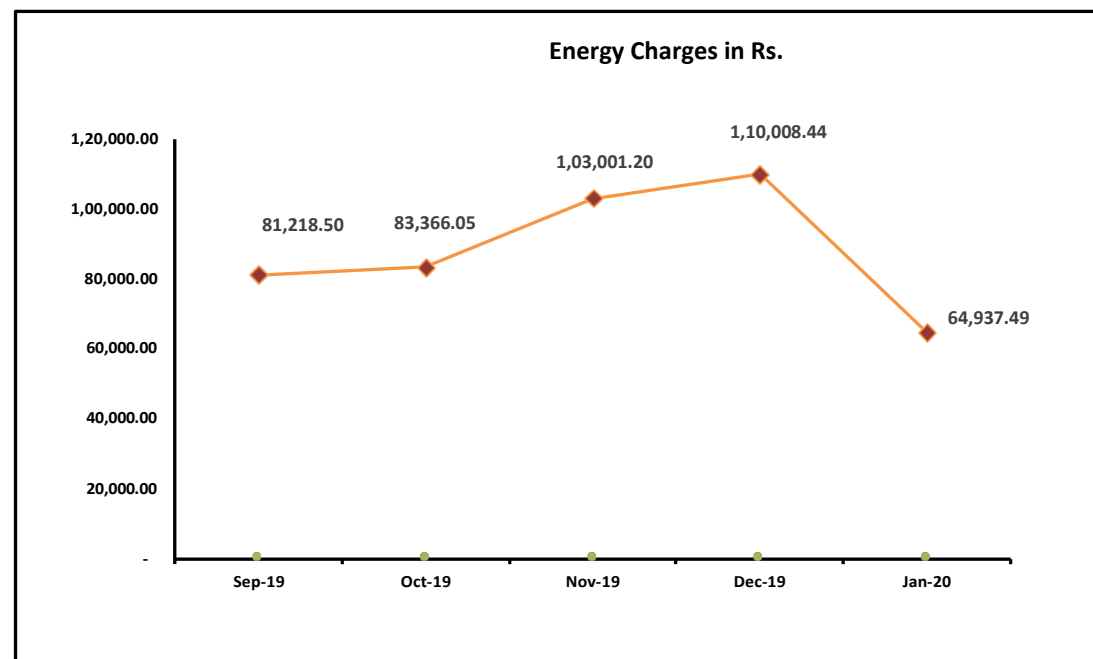


## Energy Saving Projects & Savings – Overseas Installations

MARKET SEGMENT	CLIENT NAME	LOCATION	TYPE OF LOAD	CAPACITY	UNIT TYPE	INSTALL / SAVINGS PERIOD	SAVINGS
Casino	Coushatta Casino Resort	Kinder, Louisiana	Outside & Indoor Lights/HVAC	67.5KVA	Outdoor	3 years 2 months	16-18%
Tennis Club	Racquet Club	Lake Charles, Louisiana	High Mass Lights	60 KVA	Outdoor	3 years 2 months	20-22%
Hotel / hospitality	Quality Inn & Suites	Sulphur, Louisiana	Mixed Load (Lights/HVAC)	30 KVA	Indoor	3 years 2 months	14-16%
Gas Station / Convenience Store	Chevron	Branch, Louisiana	Mixed Load (Cooler/Freezer/HVAC)	40KVA	Indoor	3 years 1 months	22-24%
Office Building	Calcasieu Parish Court House	Lake Charles, Louisiana	Mixed Load (Lights/HVAC/Office Equipment)	30 KVA	Indoor	3 Months Pilot	14-16%
Park / Recreation	Prien Lake Park	Lake Charles, Louisiana	Outside & Indoor Lights/Motors	30 KVA	Outdoor	3 Months Pilot	18-20%
Fast Food Restaurant	Adisil	Charlotte, North Carolina	Mixed Load (Lights/HVAC/Equipment)	60KVA	Outdoor	2 years 3 months	18-20%
Office Building	High Associates	Charlotte, North Carolina	Mixed Load (Lights/HVAC/Office Equipment)	22.5 KVA	Indoor	3 Months Pilot	14-16%
Hotel/ hospitality	The Royal Heritage Haveli	Jaipur, India	Mixed Load (Lights/HVAC/appliance)	60 KVA	Outdoor	2 years 3 months	23-28%
Retail/mall	Trianon Mall (Fab India)	Quatre Bornes, Mauritius	Mixed load (lights/HVAC)	30 KVA	Indoor	11 months	16-18%
Corporate office	Kheis municipality	Groblershoop, south Africa	Mixed load (light/HVAC)	22.5 KVA	Indoor	1 year 2 months	22-24%
Public works office building	Old Magistrate Court (PWB)	Kimberly, South Africa	Mixed load (light/HVAC)	22.5 KVA	Indoor	1 year 11 months	24-29%
College building	CPUT University building	Cape town, South Africa	Mixed load (light/HVAC)	22.5 KVA	Indoor	3 Months Pilot	23-27%

Customer	M/S. TECHNOFOUR ELECTRONICS PVT. LTD
Sanctioned Load (KW)	308 kW
SPO Capacity	105 KVA

	KWH	Rs.
Avg Consumption from Nov 19 to Dec 19	9411	106504
Jan-20	6911	64938
Savings	2500	41566
	27%	39%



## Energy Saving Projects & Savings – AMUL Parlor Installations in Gujrat

Parlor Details	Cost of Equipment	Equipment size KVA	Savings in %	Annual Savings Estimated in Rs.	ROI in Months
<b>AMUL PARLOUR # 3 :</b> <b>Police Head quarters</b> <b>Service No:2299683</b>	73000 /-	12 KVA	38%	52867 /-	18 Months
<b>AMUL PARLOUR # 2 :</b> <b>Maharishi Arvind Garden</b> <b>Service No:</b> <b>100048910</b>	73000 /-	12 KVA	27%	27,150 /-	34 Months
<b>AMUL PARLOUR # 1 :</b> <b>Vishramnagar Garden</b> <b>Service No: 3073566</b>	86500 /-	15 KVA	18%	40,750 /-	23 Months

## SPO – Indian Instalations

Client's Name	Place	SPO Size
Technofour	Pune, Maharashtra	45 KVA
Technofour	Pune, Maharashtra	12 KVA
Technofour Electronics Pvt. Ltd.	Khed Shivapur, Pune, Maharashtra	105 KVA
AMUL Parlors, Ahmadabad – 3 Nos.	Ahmadabad, Gujrat	12 KAV / 12 KVA / 15 KVA
Royal Haveli Palace Hotel – 2 Nos.	Jaipur, Rajasthan	105 KVA / 120 KVA
Navin Labels LLP - 2 Nos.	Odhav, Gujrat	105 KVA / 90 KVA
Kohinoor Advertisement – 5 Nos.	Pune, Maharashtra	1.5 KVA – 3 Nos. / 4.5 KVA – 1 No. / 13.5 KVA – 1 No
Trianon Shopping Mall	Mauritius	30 KVA
Siddhivinayak Aesthetics Pvt. Ltd.	Chakan, Maharashtra	750 KVA ( under execution )

<b>Total Installation</b>	<b>1.5 KVA +</b>
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# Energy Saving Projects & Savings

## Trianon Shopping Mall Project, Mauritius



Ref	Opportunity	Estimated Annual Savings			
		Units KVA	Energy Cost Savings %	Non- Energy Cost Savings %	CO2 credit %
001	Foodcourt	800	18-22 %	6-8 %	5%
002	Basement	80	20-24%	6-8 %	5%
003	Mezzanine Floor	120	23-27%	6-8 %	5%
004	Open air car park	160	15-18%	6-8 %	5%
005	Landlord	1500	5-8%	6-8 %	5%

Estimated overall Direct saving of 22-24%

Carbon credits 5%

Indirect saving on maintenance, equipment Life span and replacement – 6-8%

Savings per Month > 3,00,000 MUR ( Approx. 6 Lac INR )



## Case Study: Billboards / Hoarding Ads

### Case Study

Ino-Solar worked on a live case at one of the hoardings in a central crossroad location.

Location: Ganjwe Chowk, Pune

Total connected load: 496W

Equipment: 248W Halogen lamps - 2 Nos

Monitoring duration before up-gradation: 30 days

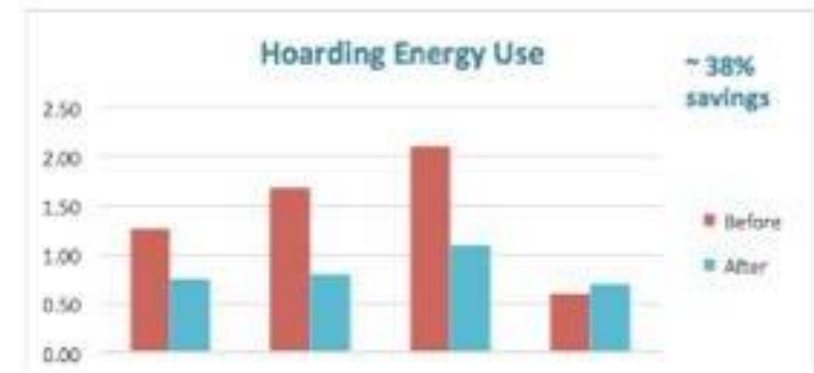
Monitoring duration after upgradation: 30 days

Energy savings methodology: Energy saver device

Daily lighting hours: 4 hours

Savings recorded: 38%

Savings payback: 34 months





# On-going Energy Saving Projects at University of Florida, Gainesville, FL, USA

## PROPOSED SYSTEM: Smart Power Optimizer With below features

- ❖ Impedance matching Transformers ( **Power Optimizer- 150KVA** )
- ❖ APFC (automatic power factor controller – 60Kvar)
- ❖ Maximum demand controller (KVA reduction)
- ❖ Load sharing/scheduling and automation control for peak/non-peak hours (optional)
- ❖ Smart Thermostats grouping and control for HVACs (optional)
- ❖ Smart metering and reporting (Part of the system).



## Estimated Savings – 18% to 22% ( \$ 10,000 to 12000 per Annum )

Billing Summary

Meter No.	Usage Particulars	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Grand Total	Savings
24190	Actuals	\$ 4,879.02	\$ 4,428.88	\$ 3,047.50	\$ 4,659.09	\$ 4,728.44	\$ 4,921.87	\$ 5,047.14	\$ 4,682.70	\$ 4,546.34	\$ 4,503.62	\$ 4,110.83	\$ 5,076.17	\$ 54,631.60	
	Minimum Savings @ 18%	\$ 4,000.80	\$ 3,631.68	\$ 2,498.95	\$ 3,820.45	\$ 3,877.32	\$ 4,035.93	\$ 4,138.66	\$ 3,839.81	\$ 3,728.00	\$ 3,692.97	\$ 3,370.88	\$ 4,162.46	\$ 44,797.91	\$ 9,833.69
	Maximum Savings @ 22%	\$ 3,805.64	\$ 3,454.52	\$ 2,377.05	\$ 3,634.09	\$ 3,688.18	\$ 3,839.06	\$ 3,936.77	\$ 3,652.50	\$ 3,546.14	\$ 3,512.83	\$ 3,206.45	\$ 3,959.41	\$ 42,612.64	\$ 12,018.95
Meter No.	Usage Particulars	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Grand Total	Savings
24191	Actuals	\$ 28.69	\$ 24.20	\$ 14.82	\$ 22.70	\$ 24.14	\$ 34.10	\$ 39.12	\$ 42.33	\$ 35.75	\$ 38.72	\$ 33.03	\$ 28.68	\$ 366.27	
	Minimum Savings @ 18%	\$ 23.53	\$ 19.84	\$ 12.15	\$ 18.62	\$ 19.80	\$ 27.96	\$ 32.08	\$ 34.71	\$ 29.32	\$ 31.75	\$ 27.08	\$ 23.52	\$ 300.34	\$ 65.93
	Maximum Savings @ 22%	\$ 22.38	\$ 18.87	\$ 11.56	\$ 17.71	\$ 18.83	\$ 26.60	\$ 30.51	\$ 33.02	\$ 27.89	\$ 30.20	\$ 25.76	\$ 22.37	\$ 285.69	\$ 80.58

# Business Models

