



Energy Efficiency

Smart Power Optimizer (SmartPO)

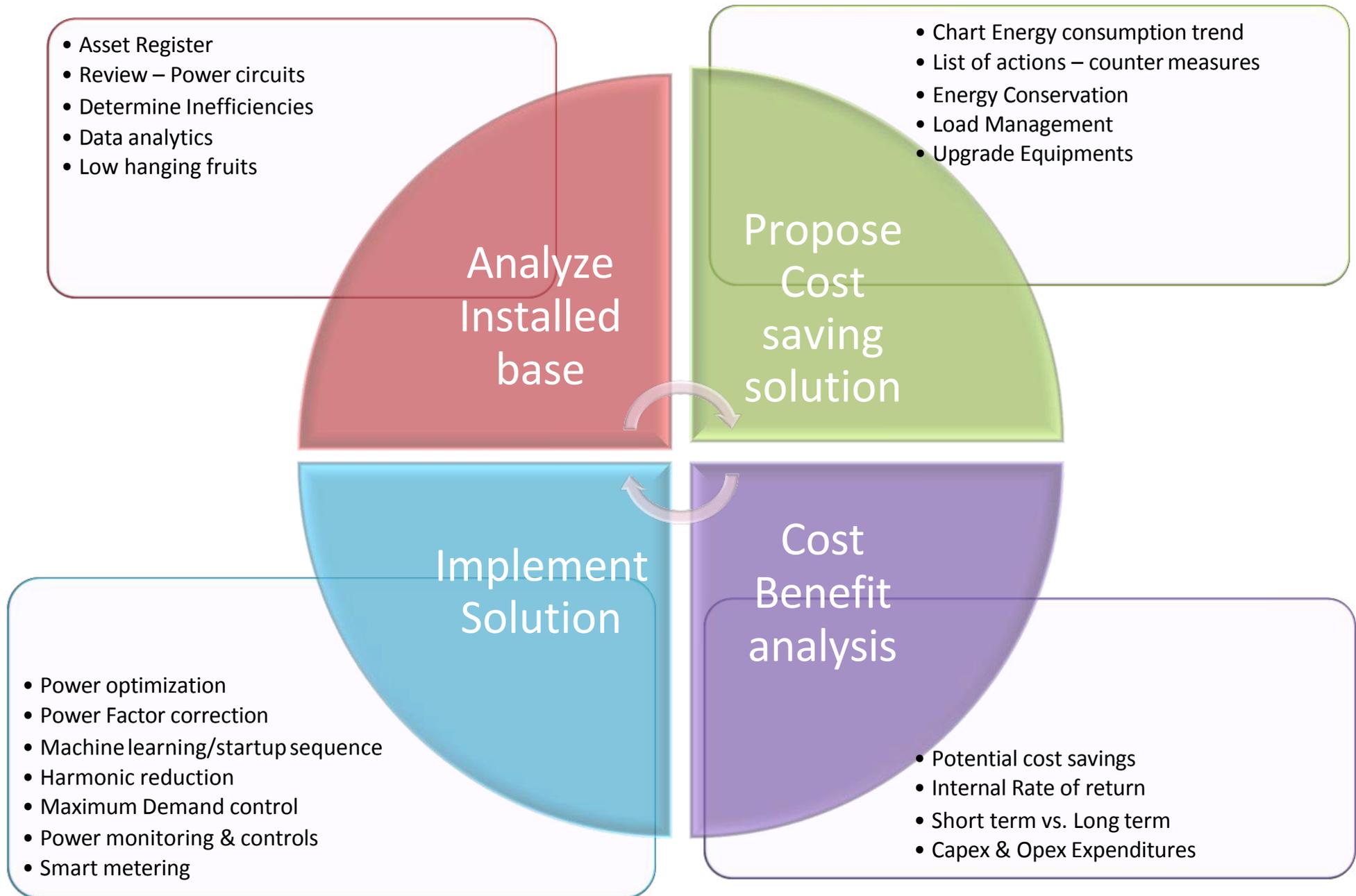
Profile -

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.

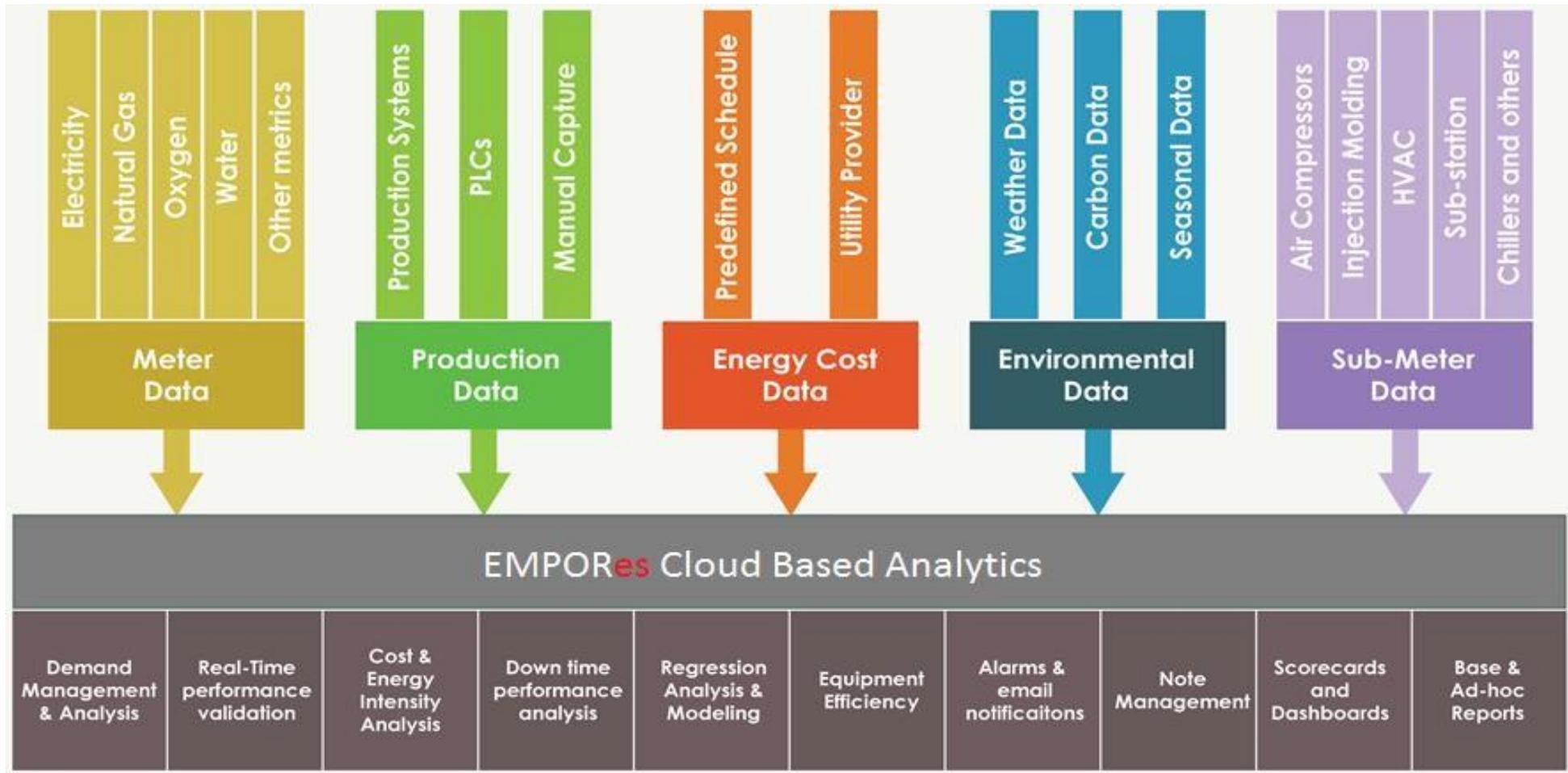
The main aim is to focus on optimizing Energy losses and resolving the issues of weak power transmissions to create a better solution in Energy Efficiency platform

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

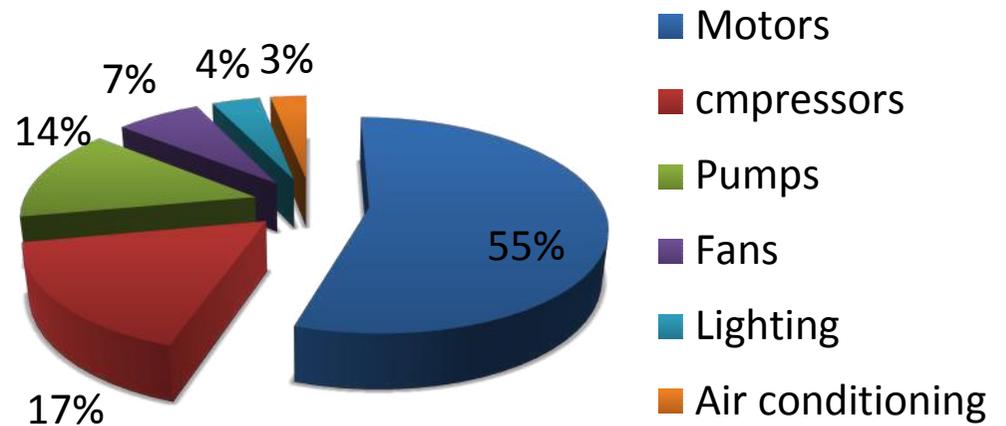


- ✓ Captive Generation-DG, Coal, Bio-mass
- ✓ Renewable energy / Hybrid energy – Solar, Wind
- ✓ Power backup-UPS, Inverters
- ✓ Heat recovery

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:

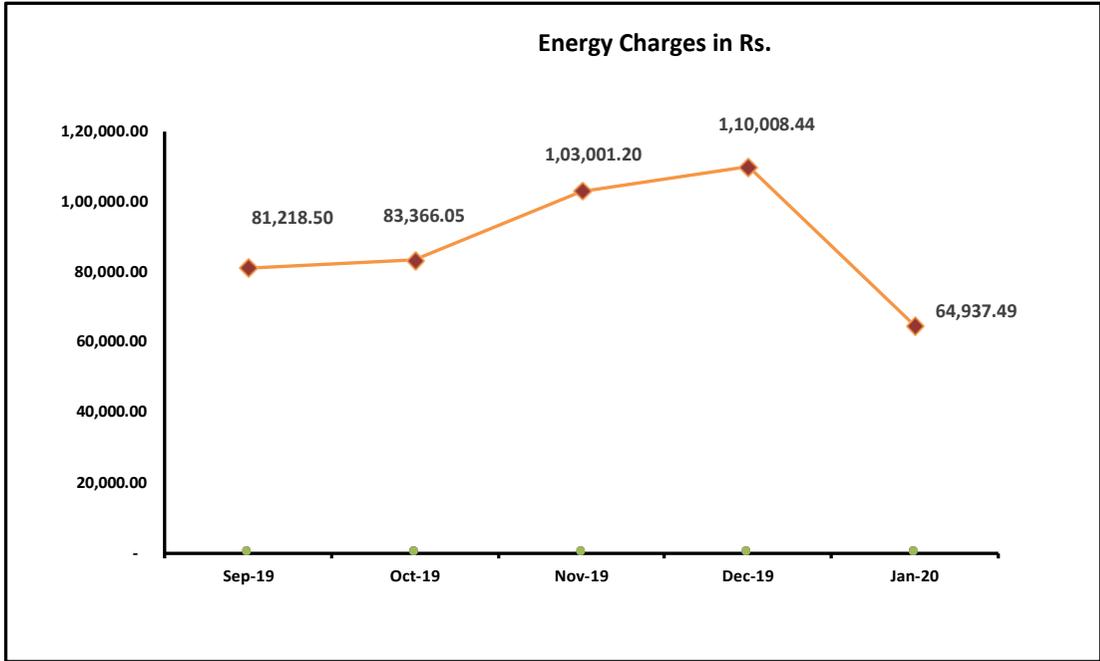
- ✓ Automatic transformer tap changing based on Load pattern
- ✓ Advanced machine learning to identify the load parameters
- ✓ Remote load monitoring, scheduling and control
- ✓ Remote configuration capability
- ✓ Automated demand response capability based on smart tariff

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
AMUL PARLOUR # 3 : Police Head quarters Service No:2299683	73000 /-	12 KVA	38%	52867 /-	18 Months
AMUL PARLOUR # 2 : Maharishi Arvind Garden Service No: 100048910	73000 /-	12 KVA	27%	27,150 /-	34 Months
AMUL PARLOUR # 1 : Vishramnagar Garden Service No: 3073566	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)

Total Installation	1.5 KVA +
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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 Saving %	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

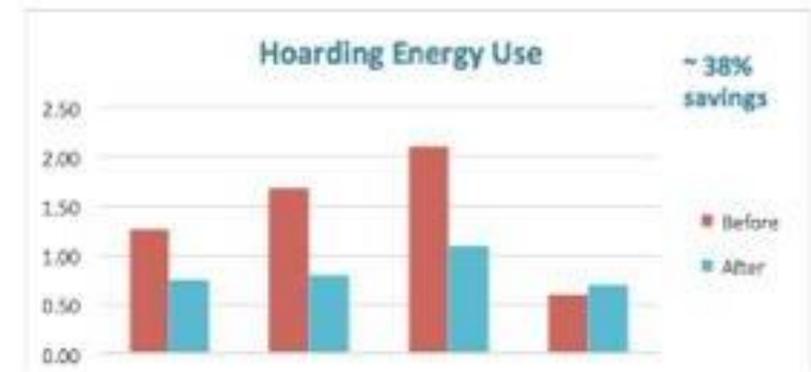
Monitoring duration after upgradation: 30 days

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



CAPEX

CAPEX Model

OPEX

Deferred Payments based on Savings

RESCO

Private Power Purchase Agreement

Project Finance

Banks, NBFC's, Investors

Leasing

Leasing Model

Subsidy

Available as per Government Nodal Agency Scheme.