



Field work in Dairy Farms Bolivia



Prepared by:
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Bolivia, September 2015

Multiservice Microturbine Plants (1)

- A Microturbine can contribute in different configurations with more than electrical power it can also be used as the main element for a Polygeneration system that can produce not only electricity, heat, hot water, drinking water, and combined refrigeration systems as well, etc. according to the requirements on the end-user.

Multiservice Microturbine Plants (2)

- CHP (Combined Heat and Power) and CCHP (Combined Cooling Heat and Power) systems can be applied. This requires the use of different kind of equipment and engineering fields too.
- A Microturbine can be applied in small and medium industries, farms, hotels, office buildings, multi-familiar buildings, shopping centers, etc.

Energy Requirements – Collecting data procedure

- In order to satisfy the energy requirements it is necessary to collect numerical data of the quantities of energy.
- For measure the quantities of energy can be used different kind of instruments, like loggers, multi-meters but also can be done some considerations and assumptions.

Steps for collecting data

- Make contact with the Organization or the Institution where can be applied a Microturbine.
- Organize a visit to the place and check all the equipment that is currently used (take notes).
- Choose the individual equipment that is going to be measured.
- Choose the measurement instrument and install it following all the safety rules.
- If it is necessary leave the instrument some days in order to have a longer register.
- Take off the instrument and take notes and pictures of the technical data necessary.

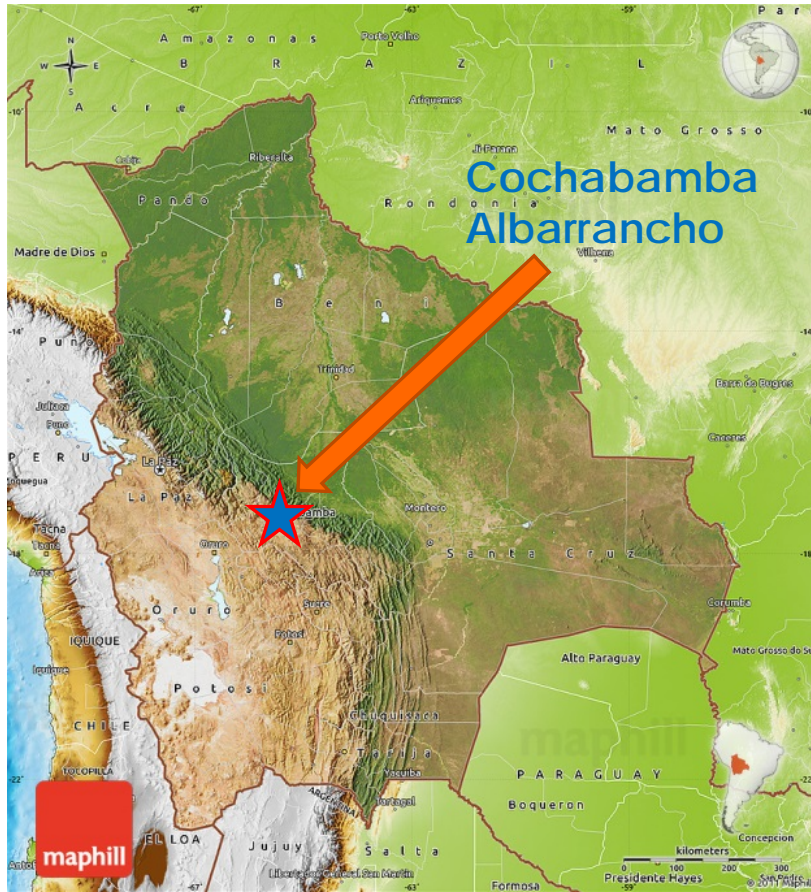
Scenario selected

- It was selected to work analysing the energy requirements of the Dairy Farms in the region of Cochabamba, central part of Bolivia. "Albarrancho" community was established by farmers long time ago and now they are still there near the city, it is a traditional place of the producers of milk.
- The main company of Dairy products buy them all the production every day.
- Currently they are still facing many problems related to the manage of energy.

About "Albarrancho" (1)

- Location: Bolivia
- Department: Cochabamba
- Municipality: Cochabamba
- Distance from the city: 5 kilometres (south)
- Altitude: 2570 meters above the sea level
- Temperatures: 15°C annual average,
 26°C max. in Summer
 6°C min. in Winter

About "Albarrancho" (2)



Dairy Farm 1



Dairy Farm 1



Dairy Farm 1



Dairy Farm 1



Dairy Farm 1



Dairy Farm 1





Dairy Farm 1

Empresa de Luz y Fuerza Eléctrica S.A. - Bolivia

NUS: 123456789 CUESTA:

CONSUMO:

LECTURA ACTUAL: 649 PERÍODO: MAY/2014

LECTURA ANTERIOR: 56856 FECHA: 16/05/14

MULT. LECTURA: 56207 FECHA: 16/04/14

POT. CONTRATADA: 1.00 FACTURADA: 0

CLIENTE: MEDRANO ZAMBRANA, ANA

N.I.T./C.I.: 3036378

DIRECCIÓN: ZN ALBA RANCHO SN 1

Nº MEDIDOR: 4400150 CATEGORÍA: AGROPECUARIA/PDBTA

FECHA DE EMISIÓN: 16/05/14 PASIBLE A CORTE DESDE: 1/1

EVOLUCIÓN DEL CONSUMO	
2014/ 5	***** 649
2014/04	***** 636
2014/03	***** 586
2014/02	***** 697
2014/01	***** 659
2013/12	***** 605
2013/11	***** 674
2013/10	***** 525
2013/09	***** 596
2013/08	***** 650
2013/07	***** 496
2013/06	***** 466
2013/05	***** 545

MESES ADEUDADOS AL: 15/05/2014 09:25

ABR/2014 MAY/2014

FACTURA ACTUAL: 272.90

FACTURAS ADEUDADAS: 268.20

TOTAL DEUDA: 541.10

OBSERVACIONES O RECOMENDACIONES

ESTIMADO CLIENTE, RECUERDE QUE: SI LA LUZ QUE APAGAS, LUZ QUE NO PAGAS

TOTAL SUJETO CRÉDITO FISCAL:-

TOTAL FACTURA ACTUAL: 221.70

SON: DOSCIENTOS SETENTA Y DOS 90/100. 272.90

FECHA VENCIMIENTO: 16/06/14 PRÓXIMA EMISIÓN:

Dairy Farm 2



Dairy Farm 2



Dairy Farm 2



Dairy Farm 2



Dairy Farm 2



Dairy Farm 2



Dairy Farm 2



Dairy Farm 2





Dairy Farm 2

efec CASA MATRIZ
Av. Heroínas 0-686 - casilla 89
Telf: 4259425 - Fax: 4259427
Empresa de Servicios Cochabamba - Bolivia

AVISO DE COBRANZA GC-0702-02

NUS: 2152 CUENTA: 03-180-117-00

CLIENTE: COM. M. R. A. A "A"
N.I.T./C.I.:
DIRECCIÓN: N. T. A. N. O. N. A.
Nº MEDIDOR: 162770 CATEGORÍA: AGROPECUARIA/PDBTA
FECHA DE EMISIÓN: 16/07 PASIBLE A CORTE DESDE: 11

CONSUMO: 1680 PERÍODO: 16/07/14
LECTURA ACTUAL: 1680 FECHA: 16/07/14
LECTURA ANTERIOR: 00 FECHA: 17/05/14
MULT. LECTURA: 1.00
POT. CONTRATADA: 1.00 FACTURADA: 0

EVOLUCIÓN DEL CONSUMO

2013/05	1680
2013/06	1735
2014/03	2089
2014/02	2069
2014/01	2238
2013/12	2361
2013/11	2439
2013/10	2032
2013/09	1820
2013/08	2026
2013/07	1702

MESES ADEUDADOS AL: 15, 4 08:34

FACTURA ACTUAL: 637.70
FACTURAS ADEUDADAS: 0.00
TOTAL DEUDA: 637.70

ESTIMADO CLIENTE, RECUERDE QUE:
"LUZ QUE APAGAS, LUZ QUE NO PAGAS"

TOTAL SUJETO CRÉDITO FISCAL: 551.50
TOTAL FACTURA ACTUAL: 637.70

SON: SEISCIENTOS TREINTA Y SIETE 30/100
FECHA VENCIMIENTO: 18/08/14 PRÓXIMA EMISIÓN: 22/08/14

Dairy Farm 3



Dairy Farm 3



Dairy Farm 3



Dairy Farm 3



Dairy Farm 3



Dairy Farm 3



Dairy Farm 3



Dairy Farm 3



Dairy Farm 3





Dairy Farm 3

Empresa de Luz y Fuerza Eléctrica Cochabamba S.A.
Av. Heroínas 0-686
Casilla N 89
Teléfono: +591 4 4200125
Fax: +591 4 4259427
Cochabamba - Bolivia

elfec

FACTURA ORIGINAL

SFC:08

NUS: 266267 CUENTA: 03-180-024-00
NOMBRE: MEDRANO OLIVA PEPE NELO

NIT/CI: 4381480
DIRECCIÓN: ZN MONTECANTO SN
CATEGORÍA: AGROPECUARIA/PDBTAR
MEDIDOR: 01459834 POTENCIA: 0

NIT: 1023213028
No.FACTURA: 725257
AUTORIZACIÓN: 3904001231149
Actividad Económica:
Venta de Energía Eléctrica
FEC EMISIÓN: Cbba,19/05/2015

CONSUMO (kWh): 590
PERIODO: MAY/2015
DE:17-04-2015 A:18-05-2015
LANT:1095 LACT:1685
FECHA PAGO: 28/07/2015 11:29
VENCIMIENTO: 22/06/2015
DÍAS MOROSIDAD: 36
PRÓXIMA EMISIÓN: 21/06/2015

INFORMACIÓN IMPORTANTE:
EMERGENCIAS: 176 24 horas
Reclamos técnicos y consultas: 4200125 o 4259400
Reclamos Comerciales: 4214456
Horarios de atención: Lunes a jueves: 8:00 a 12:00
14:00 a 18:00
Viernes: 8:00 a 16:00

TOTAL CONSUMO	208.50
TOTAL SUMINISTRO	208.50
TASA DE ASEO (HAM)	28.10
TASA ALUMB. PUBLICO (HAM)	21.80
TOTAL FACTURA	258.40
IMPORTE BASE PARA CREDITO FISCAL	208.50
TOTAL A PAGAR	258.40

Se busca:

JORGE DE LA CRUZ ROJAS
27 AÑOS

Son: Doscientos Cincuenta y Ocho 40/100 Bolivianos

CÓDIGO DE CONTROL: 64-93-7E-C5 **FECHA LIMITE DE EMISIÓN: 29-09-2015** **CAJA/610:31**

Recuerde pagar sus facturas puntualmente

"La reproducción total o parcial y/o el uso no autorizado de esta Nota Fiscal, constituye un delito a ser sancionado conforme a Ley"

Qualquier Información comuníquese al
Servicio Departamental de Gestión Social
Telfs.: 4226862 - 4227785

CERO TOLERANCIA A LA CORRUPCIÓN

Dairy Farm 3



Dairy Farm 3



Dairy Farm 3



Data collected from Dairy Farm 1

- Property Owner: Reynaldo Villegas 4378879
- Association: APL
- Location: Albarrancho
- Production per day (lts): 700-750
- Cost per litter of milk(Bs): 3, 70
- Company: PIL
- Schedule for picking up the milk: Every day
- Cows in production: 39
- Cows resting: 9
- Time for milking: 6-7 a.m. and 5-6 p.m.
- Tank capacity (lts): 1100
- Brand of refrigeration system: Different brands
- Refrigeration temperature: 3,5-4 °C
- Monthly cost per electric energy consumption (Bs): 220,90
- Energy consumption per month (kWh/month): 649
- Electric configuration and voltage: 3 phases 380/220 V
- Milking Machine: 4 points

Data collected from Dairy Farm 2

- Property Owner: Storage Center (27 members)
- Association: APL and others
- Location: Albarrancho
- Production per day (lts): 3500-3600
- Cost per litter of milk(Bs): 3, 70
- Company: PIL
- Schedule for picking up the milk: Every day
- Cows in production: A member has 8 cows those produce 180-185 lts/day, the biggest contributor leaves 350 lts/day and the smallest contributor leaves 9 lts/day
- Cows resting: 4 (for that who has 8 cows)
- Time for milking: 6-7 a.m. and 6-7 p.m.
- Tank capacity (lts): 2000 (it is filled only until 1700-1800 lts)
- Brand of refrigeration system: Different brands
- Refrigeration temperature: 4,8-5 °C
- Monthly cost per electric energy consumption (Bs): 551,50
- Energy consumption per month (kWh/month): 1680
- Electric configuration and voltage: 3 phases 380/220 V
- Milking Machine: depends on the member (that who has 8 cows in production has 2 points)

Data collected from Dairy Farm 3 (in process)

- Property Owner:
- Association: APL
- Location: Albarrancho
- Production per day (lts):
- Cost per litter of milk(Bs): 3, 70
- Company: PIL
- Schedule for picking up the milk: Every day
- Cows in production:
- Cows resting:
- Time for milking:
- Tank capacity (lts):
- Brand of refrigeration system:
- Refrigeration temperature:
- Monthly cost per electric energy consumption (Bs): 208,50
- Energy consumption per month (kWh/month): 590
- Electric configuration and voltage: 3 phases 380/220 V
- Milking Machine:

About the Energy Logger

Fluke 1730 Three-Phase Energy Logger

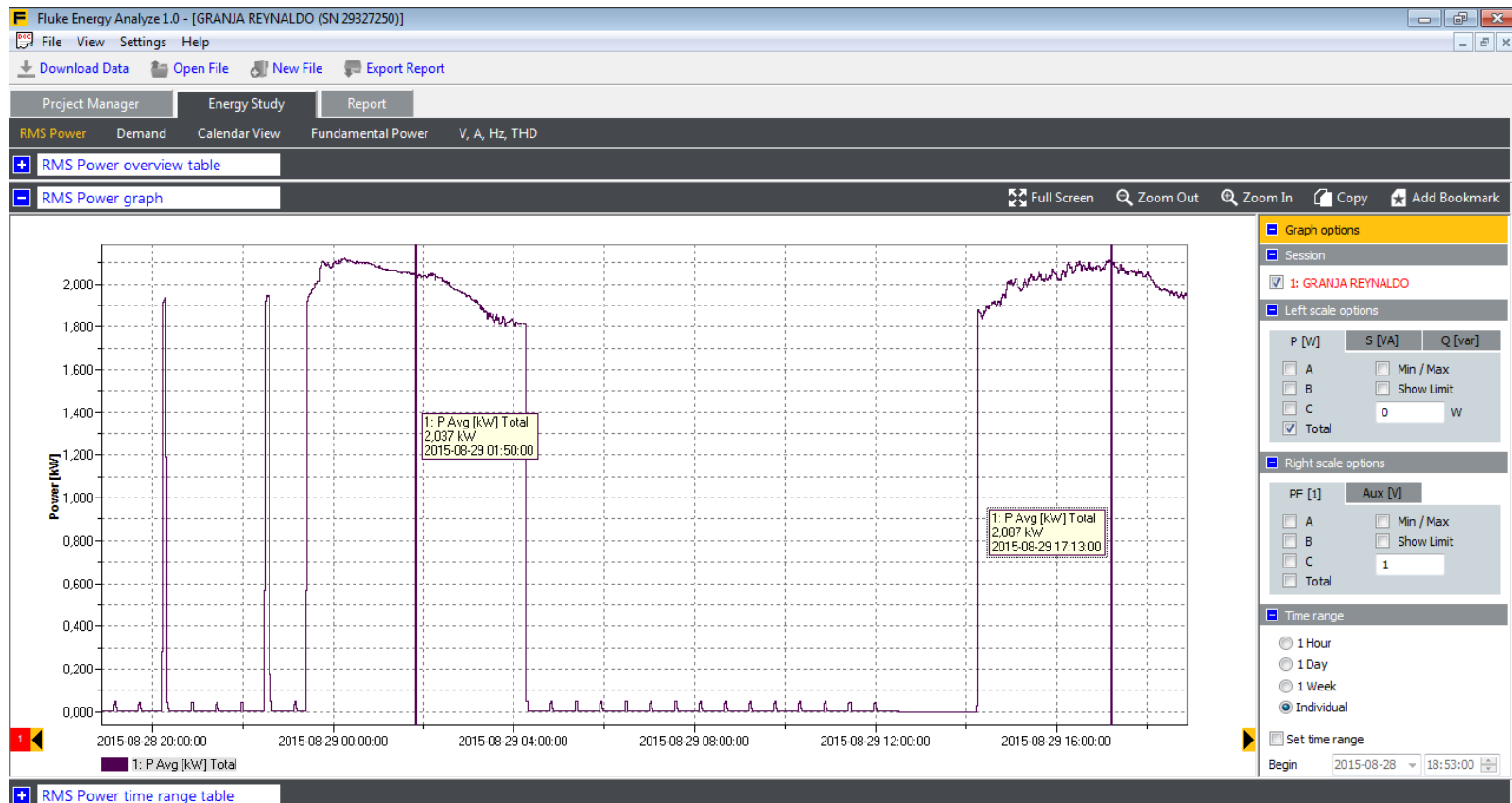
- It's designed specifically for energy conscious customers, the Fluke 1730 Three-Phase Electrical Energy Logger introduces a new simplicity to discovering sources of electrical energy waste. Profiling energy usage across the facility helping to identify opportunities for energy savings and providing an easy-to-understand data required for taking the right action.

With the 1730, it's possible:

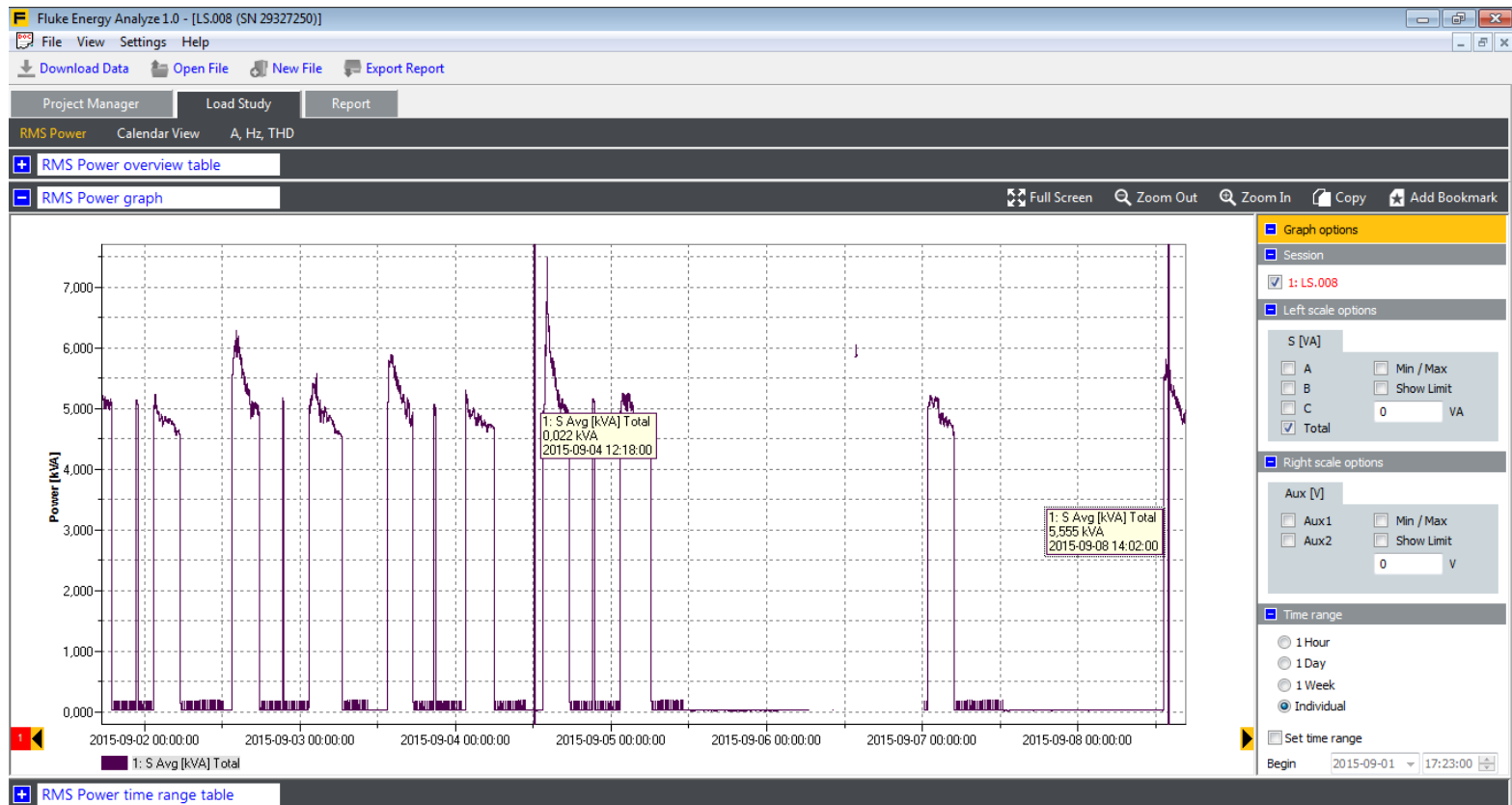
- Easily discover when and where energy is being consumed in the facility, from the service entrance to the individual circuits.
- Compare multiple data points over time and build the complete picture of energy usage with the energy analyze software package.
- Quickly understand specific points of energy loss, reduce energy bills more easily than ever.



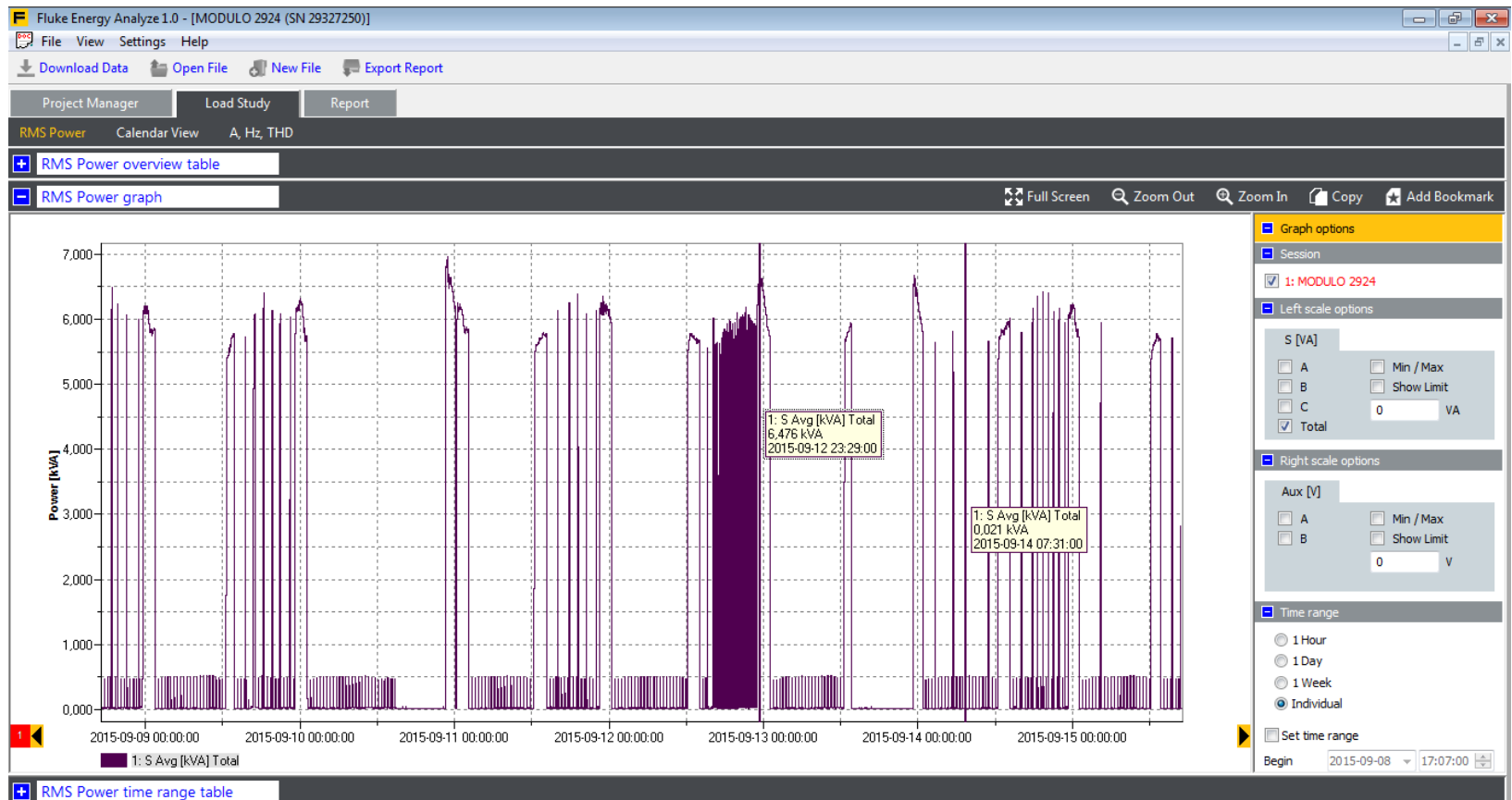
Results of the energy study



Results of the energy study



Results of the energy study

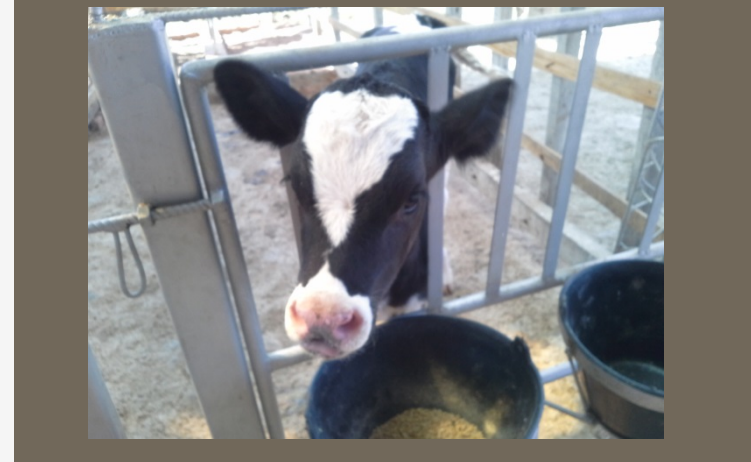


Results of the energy study

Fluke Energy Analyze 1.0 - [GRANJA REYNALDO (SN 29327250)]					
File View Settings Help					
Download Data Open File New File Export Report					
Project Manager Energy Study Report					
RMS Power Demand Calendar View Fundamental Power V, A, Hz, THD					
+ RMS Power overview table					
+ RMS Power graph					
- RMS Power time range table					
Full Screen Copy Add Bookmark					
GRANJA REYNALDO					
Active Power [kW]	A	B	C	Total	Logging Information
Max				8,225 kW	Study type: Energy study Topology: 3-ph Delta Start date: 2015-08-28 18:53:00 End date: 2015-08-29 18:53:00 Duration: 1d 0h 0m 0s Averaging interval: 1min Number of averaging intervals: 1440 (1440) * ... series contained invalid values that have been discarded for the shown result.
				2015-08-29 14:15:00	
Avg				0,814 kW	
Min				-0,000 kW	
				2015-08-29 14:05:00	
Apparent Power [kVA]	A	B	C	Total	
Max				14,608 kVA	
				2015-08-29 14:15:00	
Avg				2,018 kVA	
Min				0,003 kVA	
				2015-08-29 13:17:00	
Reactive Power [kvar]	A	B	C	Total	Study type: Energy study Topology: 3-ph Delta Start date: 2015-08-28 18:53:00 End date: 2015-08-29 18:53:00 Duration: 1d 0h 0m 0s Averaging interval: 1min Number of averaging intervals: 1440 (1440) * ... series contained invalid values that have been discarded for the shown result.
Max				12,073 kvar	
				2015-08-29 14:15:00	
Avg				1,846 kvar	
Min				0,003 kvar	
				2015-08-29 13:17:00	
Power Factor [1]	A	B	C	Total	
Max				0,80*	
				2015-08-29 05:22:00	
Avg				0,40	
Min				0,22*	
				2015-08-28 22:37:00	

Future work

- Use the data collected for writing documents comparing and analyzing energetic and economic advantages and disadvantages of the use of conventional electricity, cooling and heating systems versus the use of Multiservice Plants.



Thanks
for your
attention !!!

