

# SIEMENS

Delivering power to the planet

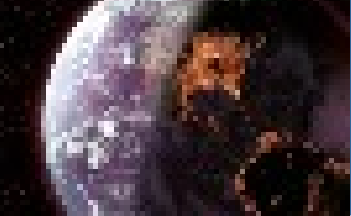


## SIEMENS

---

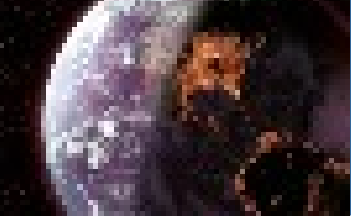
**Energy Distribution  
Operation and Maintenance**

**Siemens Control  
Centers:  
The Spanish One**



**The idea behind it**

**DELIVERING CONTROL CENTER POWER  
TO THE SMALL UTILITIES**



# TEAM WORK

## SIEMENS CONTROL CENTERS AROUND THE WORLD:

- ❑ WELLINGTON (NEW ZEALAND): Distribution Control Center.
- ❑ MILAN (ITALY): Wind farms Control Center (only switches and power monitoring).
- ❑ SEVILLA (SPAIN): Energy Control Center for renewable energy power plants, connected to the TSO.



# Control Centre & Operation

## □ SEVILLE CONTROL CENTER FUNCTIONS: PRESENT AND FUTURE

### RENEWABLE ENERGY GENERATION

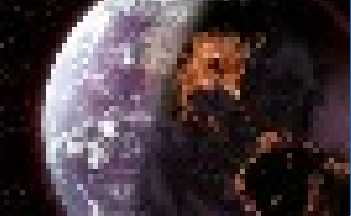


### STREET LIGHTING



### E-CARS





# Control Centre & Operation

## Renewable Energy Generation in Spain

The plants over 1 MW have to belong to a Control Center that represent the plants in the operation with DSO and TSO.

The Control Center also has to send generation data to TSO and receive power limitation from TSO ( REE CECRE ).

The Substation that connect with TSO grid have also to be operated by a Control Center.



# Control Centre & Operation

**SIEMENS**

Delivering power  
to the planet

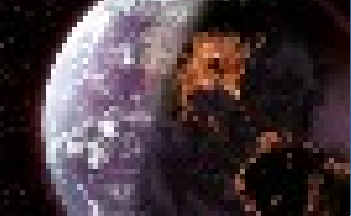
## Figures 1

80 power plants: 43 wind farms, 31 co-generation, 3 biomass, 2 hydro, 1 experimental engines

2 main customer, 30 final customers (plant owners)

Plants around all Spain

Total intalled power, 1 900 MW



# Control Centre & Operation

**SIEMENS**

Delivering power  
to the planet

## Figures 2

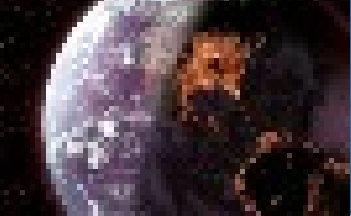
~50 wind production reductions in nodes per year

~4 national reductions in wind production

~20 thermal reductions per year

~30 000 reports delivered to customer per year

60 jobs in field coordinated with DSO and TSO per year



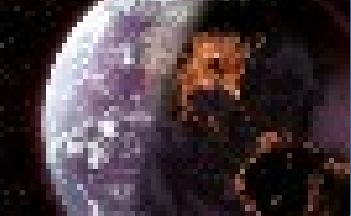
# Control Centre & Operation

## Flexibility in data connections

Data coming from different customers, not from owned grid.

Flexibility to adapt to different communication protocols (IEC104, Modbus...) and connections (ADSL, 3G, OPC...).

Offering monitoring solutions for different plants lay-out, minimizing the cost as much as possible.



# Control Centre & Operation

**SIEMENS**

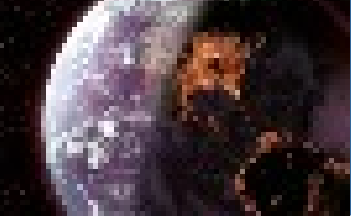
Delivering power  
to the planet

## Services to be delivered in short term

Secondary regulation

Substation operation

Wind farm monitoring and operation



# Control Centre & Operation

**SIEMENS**

Delivering power  
to the planet

## Added value services

EBIT maximizing by optimisation of the relationship between power generation and selling price curve.

Turnout management and invoicing losses.

# Control Centre & Operation

## □ DISPLAY FOR OPERATORS

Planta	RTU	IFS	INT	Nom.	Motivo	Lim. REE	Mot. env.	Lim. env.	Poten.	Q	V	Temp.	Vel.	Dir.
PE_HALCON_(ANTONIO_SL)	🟢	🔴	🟢	19.5	NO	19.50	NO	19.50	5.71	0.00	19.87	0.00	0.00	0.00
PE_NABADRE_(EOLICA_PROD)	🟢	🔴	🟢	31.35	NO	32.05	NO	32.05	7.83	0.27	38.20	18.80	5.20	323.00
PE_BODEGASA_(MAR)	🟢	🔴	🟢	18	NO	18.00	NO	18.00	0.70	0.00	88.00	22.65	4.67	84.00
PE_BELICOR_(EOLICA_PROD)	🔴	🔴	🟢	28.9	NO	28.90	NO	28.90	9.50	-1.73	11.60	0.00	0.00	124.00
PE_TACHINA_(ELOFER)	🟢	🟢	🔴	48	NO	48.00	NO	48.00	4.83	0.00	136.50	0.00	0.00	0.00
PE_SERVO1_(EOLICA_PROD)	🟢	🔴	🟢	28.7	NO	29.40	NO	29.40	2.56	0.44	38.70	21.20	4.70	315.00
PE_SERVO2_(EOLICA_PROD)	🟢	🔴	🟢	30.8	NO	30.80	NO	30.80	1.10	0.45	38.10	0.00	4.80	0.00
PE_JOCASAR_(ANTONIO_SL)	🟢	🔴	🟢	15	NO	15.00	NO	15.00	0.35	0.17	20.30	0.00	0.00	0.00
PE_REVERCO_(SOLEOL)	🟢	🔴	🟢	24	NO	24.00	NO	24.00	14.90	-1.55	66.63	15.00	13.50	40.00
PE_SORROCA_(EOLICA_PROD)	🟢	🔴	🟢	30.1	NO	30.30	NO	30.30	0.94	0.09	39.40	24.00	5.50	313.00
PE_LUCERO_(ELOFER)	🟢	🔴	🟢	28.8	NO	28.80	NO	28.80	4.88	0.22	136.62	18.80	5.35	305.00
PE_INGREDO_(ENSAL)	🟢	🔴	🟢	19.5	NO	19.50	NO	19.50	0.00	0.00	0.00	0.00	0.00	0.00
PE_LA_COSTERA_(ELOFER)	🟢	🔴	🟢	44.8	NO	44.80	NO	44.80	4.56	-1.48	67.46	0.00	0.00	1.88
PE_SAN_ROMAN_(MAR)	🟢	🔴	🟢	40	NO	40.00	NO	40.00	36.91	-6.41	230.26	14.00	0.00	329.00
PE_MARAVIA_(MAR)	🟢	🔴	🟢	29.8	NO	29.80	NO	29.80	6.85	-1.13	66.00	21.00	0.00	307.00
PE_MULA_(MAR)	🔴	🔴	🟢	16.05	NO	0.00	NO	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PE_CERROSUR_(ELOFER)	🟢	🔴	🟢	36.8	NO	36.80	NO	36.80	3.99	-0.20	136.41	0.00	6.29	45.00
PE_MANGOMORENA_(MAR)	🟢	🔴	🟢	25	NO	25.00	NO	25.00	1.25	-0.28	134.00	21.55	4.20	157.00
PE_PENONAR_(GAVOFER)	🟢	🔴	🟢	48.43	NO	48.43	NO	48.43	5.57	0.00	135.08	18.70	4.50	73.00
PE_ROUDEL_(RENOVENER)	🟢	🔴	🟢	18	NO	18.00	NO	18.00	4.90	0.00	29.99	16.40	4.50	695.00
PE_EL_JAUJAR_(MAR)	🟢	🔴	🟢	39.6	NO	39.60	NO	39.60	32.90	1.36	78.55	0.00	10.70	59.99
PE_GAPILLERIA_(MAR)	🟢	🔴	🟢	24.4	NO	24.40	NO	24.40	2.94	-0.34	141.40	0.00	0.00	0.00
PE_POLAGRAN_(ELOFER)	🟢	🔴	🟢	14.4	NO	14.40	NO	14.40	0.19	0.25	136.44	0.00	0.00	0.00
PE_REMIN1_(ELOFER)	🟢	🔴	🟢	49.5	NO	49.50	NO	49.50	-0.27	0.09	134.70	0.00	3.60	56.00
PE_REMIN2_(ELOFER)	🟢	🔴	🟢	48.74	NO	48.74	NO	48.74	-0.18	0.04	131.20	13.90	4.30	33.00
PE_ADOPASA_(ELOFER)	🟢	🔴	🟢	9.6	NO	9.60	NO	9.60	0.06	0.14	67.50	-30.00	8.63	94.00
PE_EL_CHORRO_(EOLICA_TENSION)	🟢	🔴	🟢	14.45	NO	14.45	NO	14.45	-0.03	0.05	132.98	19.50	3.90	176.90
PE_LUCENERO_(RENOVENER)	🟢	🔴	🟢	13.2	NO	13.20	NO	13.20	2.38	0.00	30.00	66.00	0.00	0.00
PE_SIERRAMORENA_(EOLICA_PROD)	🟢	🔴	🟢	16.5	NO	16.50	NO	16.50	1.65	0.10	38.30	-19.00	0.00	45.00
PE_SAN_LUIS_(EOLICA_PROD)	🟢	🔴	🟢	15	NO	15.00	NO	15.00	3.19	0.11	38.60	0.00	0.00	337.00
PE_NAVARGASA_(MAR)	🟢	🔴	🟢	44.8	NO	44.80	NO	44.80	11.49	-1.98	65.69	0.00	0.00	0.00
PE_ALCALASA_(ALCALASA)	🟢	🔴	🟢	17.56	NO	17.56	NO	17.56	1.89	-0.05	136.84	0.00	0.00	0.00
PE_SIERRASON_(MAR)	🟢	🔴	🟢	44	NO	44.00	NO	44.00	8.34	-1.47	135.88	0.00	0.00	0.00
PE_TUNAR_(SEPRON)	🟢	🔴	🟢	20	NO	20.00	NO	20.00	1.44	0.10	11.60	0.00	0.00	0.00
PE_VELBONEO_(DACEDEL)	🟢	🔴	🟢	30.4	NO	30.40	NO	30.40	3.10	-0.42	45.00	14.40	5.65	48.00
PE_ISBILIYA_(MAR)	🔴	🔴	🟢	24.5	NO	23.21	NO	23.21	0.00	0.00	0.00	0.00	0.00	0.00
PE_NOVILLAR_1_(ELOFER)	🟢	🔴	🟢	48.3	NO	48.30	NO	48.30	3.14	-1.55	0.00	0.00	5.70	116.00
PE_NOVILLAR_2_(ELOFER)	🟢	🔴	🟢	18.4	NO	18.40	NO	18.40	1.38	-0.79	0.00	0.00	5.20	145.50
CABLE_(ENEOL)	🟢	🔴	🟢	31.2	NO	31.20	NO	31.20	19.48	-0.93	68.01	-15.00	12.10	153.00
PE_ROSETAR_(SEPRON)	🟢	🔴	🟢	20	NO	20.00	NO	20.00	1.30	0.17	20.20	0.00	0.00	0.00

2010-06-29 0:57:10 GMT+0200 Hora de generacion: Tue Jun 29 00:56:49 CEST 2010 © 2010 Siemens S.A.

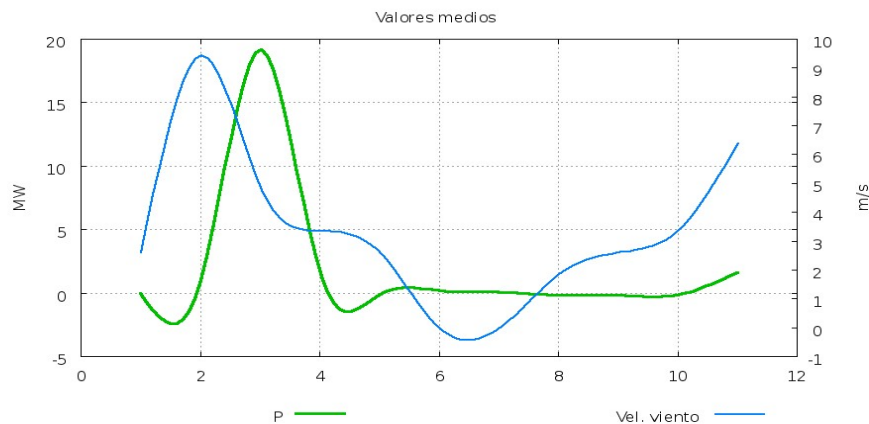
# Control Centre & Operation

## □ DISPLAY OF VALUES IN REAL TIME FOR CUSTOMERS



### PE EOLO 5

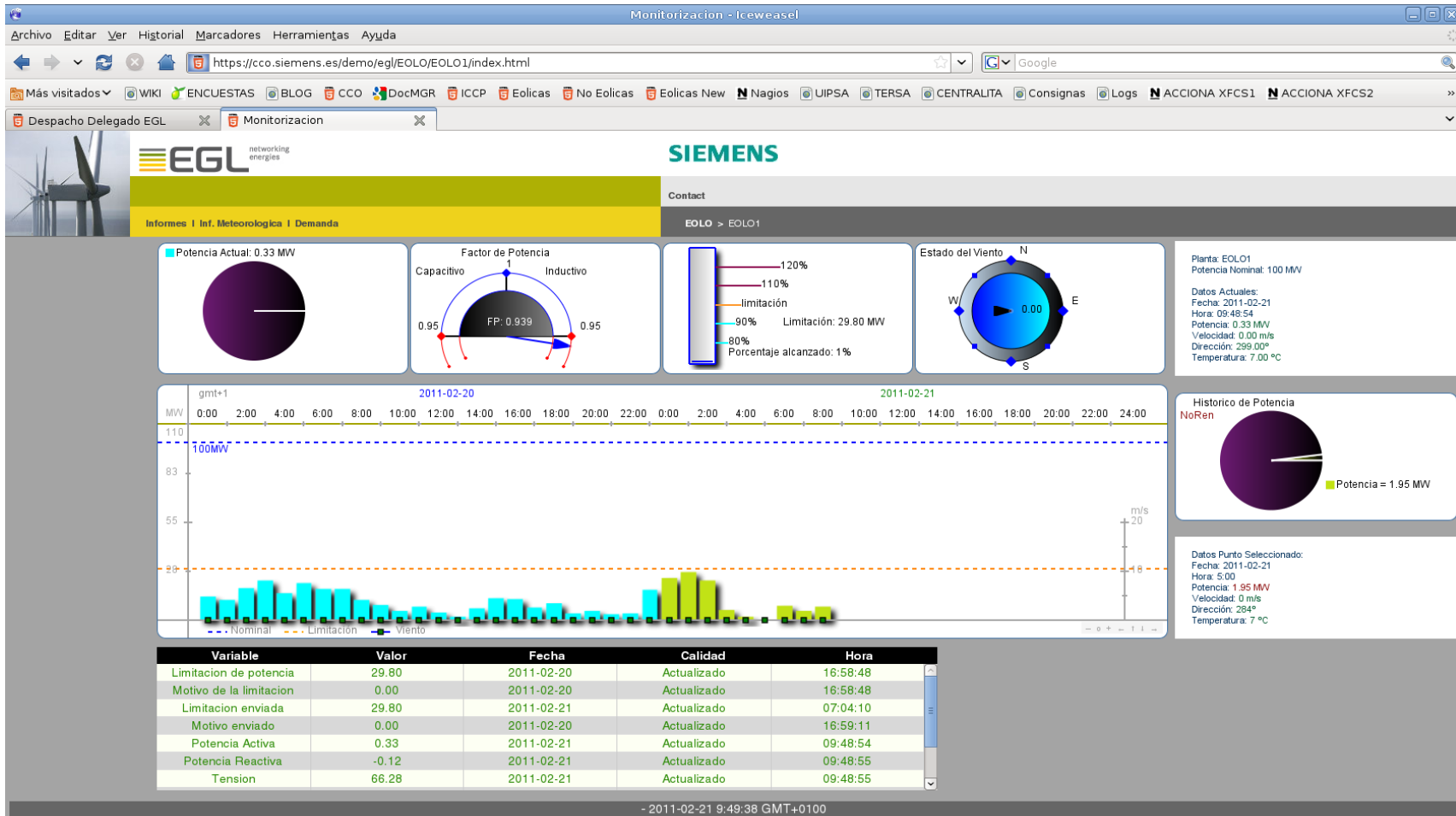
EOLO	INFORMES	AVISOS Y PRODUCCIÓN EÓLICA			
	VARIABLE	VALOR	FECHA	HORA	CALIDAD
	MOTIVO REE	0	2010-06-29	01-00-24	ACTUALIZADO
	LIMITACIÓN REE	35.60	2010-06-29	01-00-24	ACTUALIZADO
	MOTIVO ENVIADO	0	2010-06-29	01-00-24	ACTUALIZADO
	LIMITACIÓN ENVIADA	35.60	2010-06-29	01-00-24	ACTUALIZADO
	POTENCIA ACTIVA	32.42	2010-06-29	01-00-24	ACTUALIZADO
	POTENCIA REACTIVA	1.64	2010-06-29	01-00-24	ACTUALIZADO
	TENSIÓN	131.77	2010-06-29	01-00-24	ACTUALIZADO
	VELOCIDAD DEL VIENTO	11	2010-06-29	01-00-24	ACTUALIZADO
	DIRECCIÓN DEL VIENTO	267	2010-06-29	01-00-24	INVALIDO
	TEMPERATURA DEL VIENTO	28	2010-06-29	01-00-24	NO ACTUALIZADO



- 2010-06-29 1:00:25 GMT+0200

# Control Centre & Operation

## DISPLAY IN REAL TIME FOR CUSTOMERS



# Control Centre & Operation

## □ STREET LIGHTING:

- Smart lighting.
- Saving energy up to 60%.
- Reducing CO2 emissions.
- Saving costs in maintenance
  - Real time data.
  - Fast detecting incidents (broken parts, robbery...)
  - Increasing life of components.
- Monitoring and operation.



# Control Centre & Operation

## Street Information Table

Online reports about average data of the selected street



## Alerts Area

Alert List in the Zone.

Información de la calle:

ALERTAS		
Fallos en Luminarias		1
Fallos en Balastos		2
Fallos de Comunicación		1
ALERTAS CRITICAS		
Fallos en Luminarias		1
Fallos en Balastos		2
Fallos de Comunicación		1

Zonas: [dropdown] Calle: [dropdown] Elemento: [dropdown]

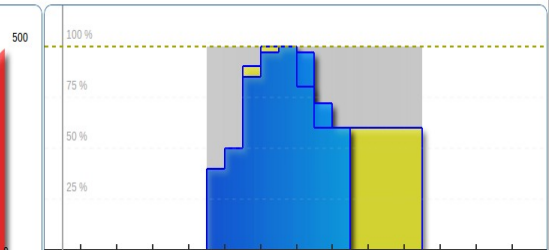
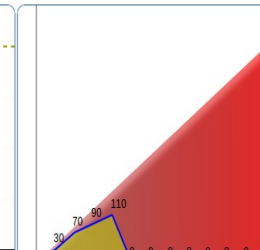
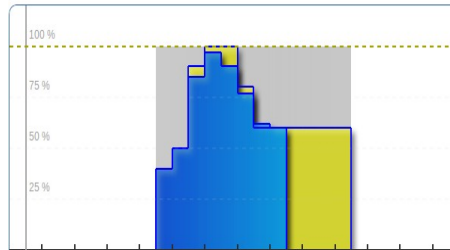
limpiar

Identificador	z0c0ef0		
tipo farola	SAP,165	P	120 VA
NLR	99	E	20 kVAh
NLT	80	Temp	60 °C
ESTADO	70 %	RSSI	90 %
i RSM	30 mA	Horas On	1230 h
V RSM	210 V	H Rest	h

Monitor de Regulación Lumínica. Calle: Av. Innovacion

Monitor de ahorro anual: Av. Innovacion

Monitor de Regulación Lumínica. Elemento: z0c0ef0



## Element and street grafics

- Scheduled and .measured lighting level.
- Data of planned and actual savings

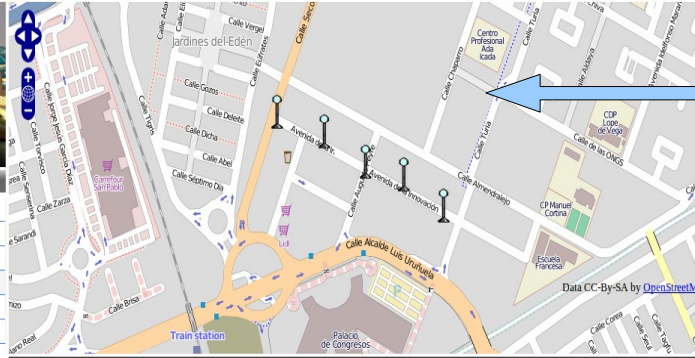
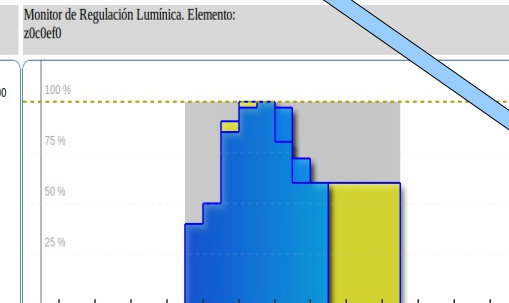
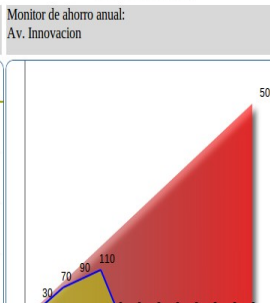
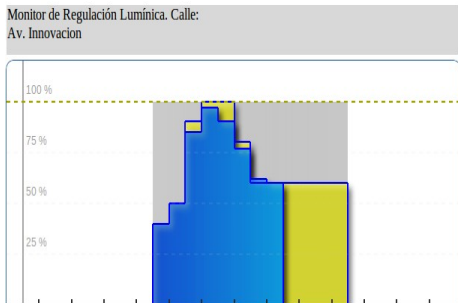
# Control Centre & Operation



Av. Innovacion			
Nivel Lumínico (%)	76		
Nivel Regulación (%)	64		
Ahorro Energético Instantáneo (W)	1200		
Ahorro Acumulado	Diario	Mensual	Anual
Energía (kWh)	80	400	1250
CO2 (Kg)	30	500	8000

Información de la calle:

ALERTAS	
Fallos en Luminarias	1
Fallos en Balastos	2
Fallos de Comunicación	1
ALERTAS CRITICAS	
Fallos en Luminarias	1
Fallos en Balastos	2
Fallos de Comunicación	1



Identificador: z0c0ef0

tipo farola	SAP,165	P	120 VA
NLR	99	E	20 kVAh
NLT	80	Temp	60 °C
ESTADO	70 %	RSSI	90 %
I RSM	30 mA	Horas On	1230 h
V RSM	210 V	H Rest	h

## GIS

- Show the luminaries and alerts layers.
- Allows interactivity with the mouse.

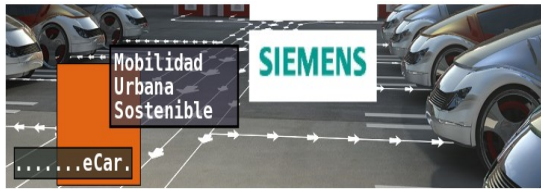
## Selection Area

- Area, street and element selection
- Selection is possible through mouse and formulary.

## Luminary Information Table

- Static and dynamic data of the luminary.
-

# Control Centre & Operation



Torneo			
Nivel Ocupación (%)	79		
Capacidad de Servicio (%)	63		
Energía Instantánea (kW)	1233		
Servicio Acumulado	Diario	Mensual	Anual
Energía (kWh)	83	400	1250
Horas (h)	30	500	8000

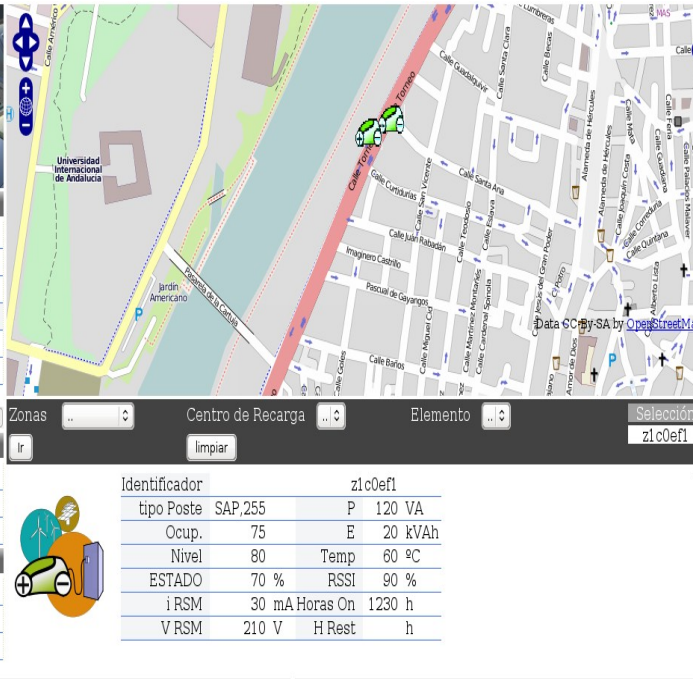
Información

ALERTAS

Fallos de línea	1
Fallos en Poste de Recarga	2
Fallos de Comunicación	1

ALERTAS CRÍTICAS

Fallos de línea	1
Fallos en BPoste de Recarga	2
Fallos de Comunicación	1



Zonas:  Centro de Recarga:  Elemento:  Selección:

Identificador	z1c0ef1		
tipo Poste	SAP,255	P	120 VA
Ocup.	75	E	20 kVAh
Nivel	80	Temp	60 °C
ESTADO	70 %	RSSI	90 %
i RSM	30 mA	Horas On	1230 h
V RSM	210 V	H Rest	h

GIS:  
- Show the charge points layer and alerts layer.

Online data of the selected point, and the center of charge points.

Alerts Area:  
Show the number and types of alerts in the whole section.