



ENERGY SYSTEMS ITALY SRL

PV field design, engineering and construction services

A case study



ENERGY SYSTEMS ITALY SRL

A case study in ESI value added

- In this case study we aim to show how ESI helped one of its customers establish their first ever PV field in Italy by designing, engineering and construction of a 2MWp PV field, in southern Italy's Puglia region
- We will follow the steps where ESI has been involved in, from concept to commissioning of the PV field
- Our client, Powercom Yuraku Pte Ltd., a joint venture of Powercom Corporation of Taiwan, a listed solar cell and panel manufacturer, wanted a reliable, experienced PV engineering partner to establish its first PV fields in Italy



- **This was Powercom Yuraku's first PV field ever and with Powercom a listed company they needed to select a partner with proven excellence and a long track record in PV field design and engineering, to oversee their PV field construction program in Italy**
- Powercom Yuraku settled for ESI after a lengthy selection process

Laterza 1-2, 2MWp c-Si PV system, Puglia, Italy

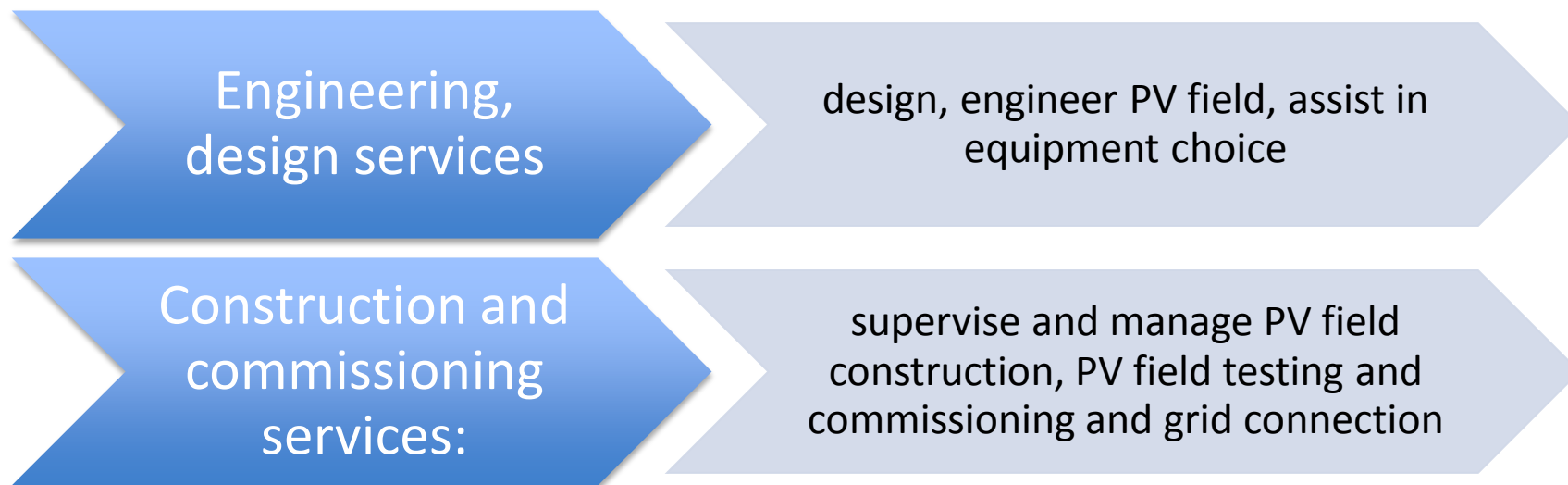


Laterza 1-2, 2MWp c-Si PV system, Puglia, Italy

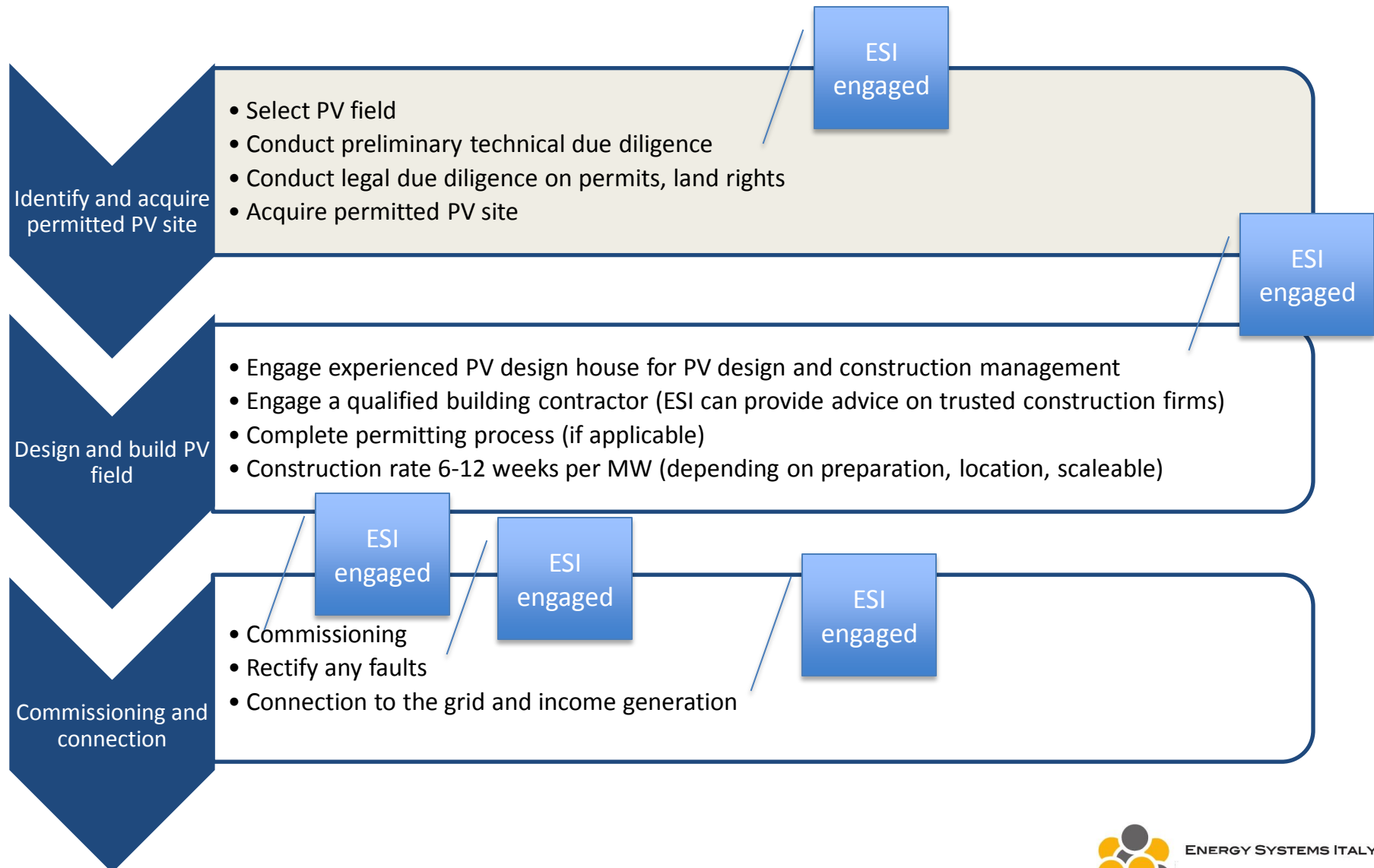
- Total installed power capacity: 2MWp (1981.5 kWp)
- Comprising of: 9174 c-Si PV modules
- PV modules: Yuraku A-P. 216, multicrystalline, 216Wp
- Inverters: Power One, nr. 36 units, each 55kVA
- MV transformers: 2 transformers take system voltage to 20,000 V for connection to Enel's MV line
- Hot zinc coated metal structures are designed for a virtually maintenance-free life of 30-years
- PV field layout: 417 strings of 22 PV modules each connected in series
- Each string is connected to the inverters through parallel junction boxes with Hall sensors, switching capability to selectively maintain strings in the PV field
- Care has been taken to accurately size cables and all wiring to minimise losses and optimise performance over a 20 year expected lifetime
- PV modules have been selected for each string so as to maximise efficiency
- Total system losses are expected to amount to some 10%
- Annual energy production is expected to be: 2,622,000 kWh
- A total solution surveillance system allows our client to monitor in real time the performance of the PV field to maximise security and reduce maintenance to on-demand basis, substantially reducing costs

What was ESI engaged to do?

For the Laterza project Powercom Yuraku engaged ESI to perform the following services:



PV field establishment cycle (typical Italy)



EPC services

Engineering, design

Producing a detailed design for the PV systems as well as all executive drawings covering all aspects of PV system engineering and design to a suitable legal and engineering standard suitable for GSE review and for the PV field construction company to produce a detailed construction specification.

- Detailed technical description
- Electrical schematic drawings showing all components and electrical data points
- PV system drawings
- Technical specification guide and purchasing specifications of all the works and components to be used in the PV system
- User, maintenance and safety manual
- Indicative timetable of activities



EPC services

Engineering, design

In particular the technical description must include:

- Type and general description of the PV system
- Project data
- Legal and statutory references
- Criteria for the choice and dimension of the systems
- Description of the PV system
- Components of the PV system
- Technical specifications of the components
- PV system operation
- Review of the electrical and mechanical components of the PV system
- Performance data
- Summary datasheet



EPC services

Engineering, design

Why is engineering design critical?

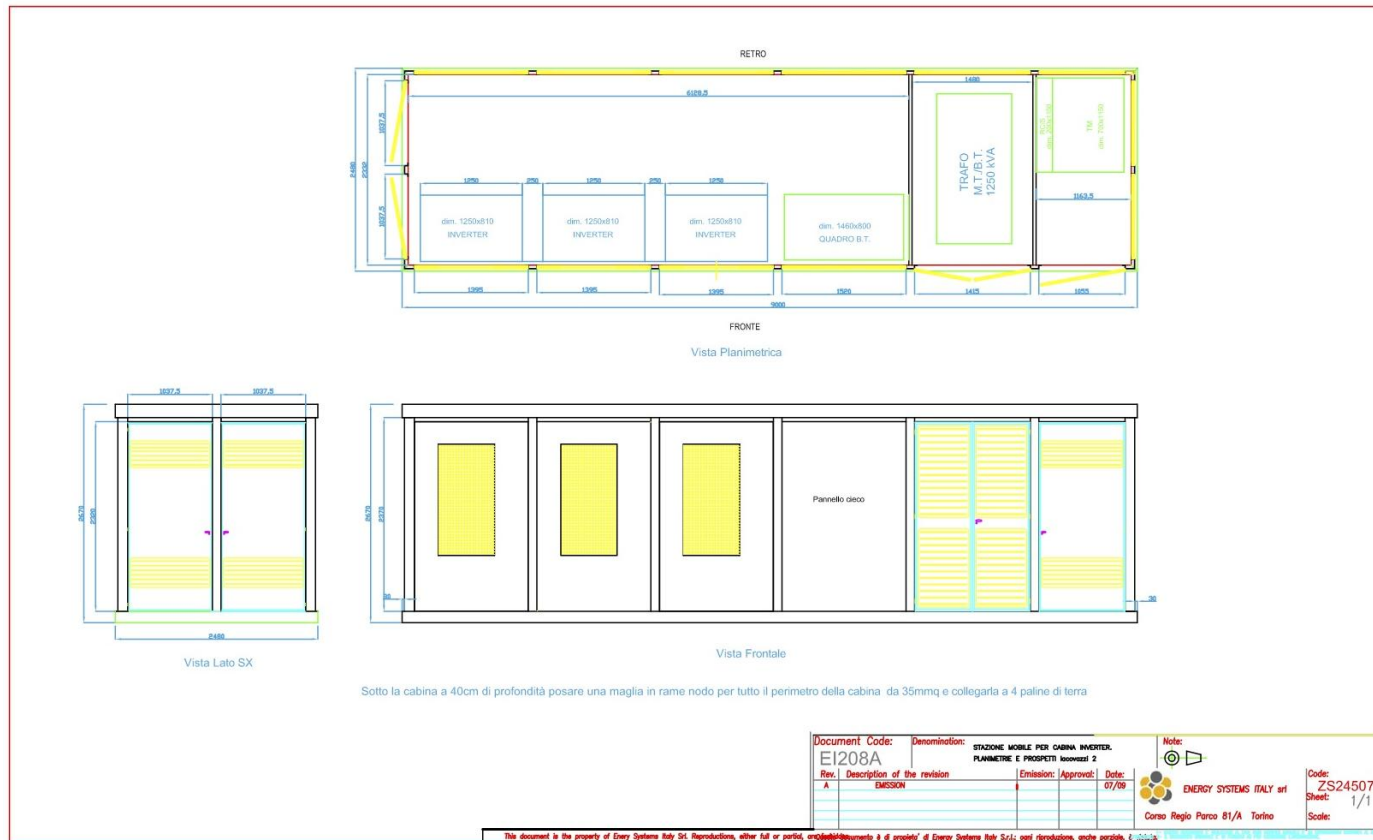
It is not enough to be able to design a functioning, PV system. The difference in efficiency between different PV system designs can be very significant and can lead to very large differences in the economics of a PV system.

For example taking a 1MWp PV system installed in the south of Italy as a reference, a 5% difference in efficiency (a relatively small amount) will result in a revenue difference of some €36,000.- per annum. Over 20 years this would amount to some €720,000.- in lost revenues. **For a PV system financed with 80% leverage this would result in a 4.9% decline in investment IRR.**



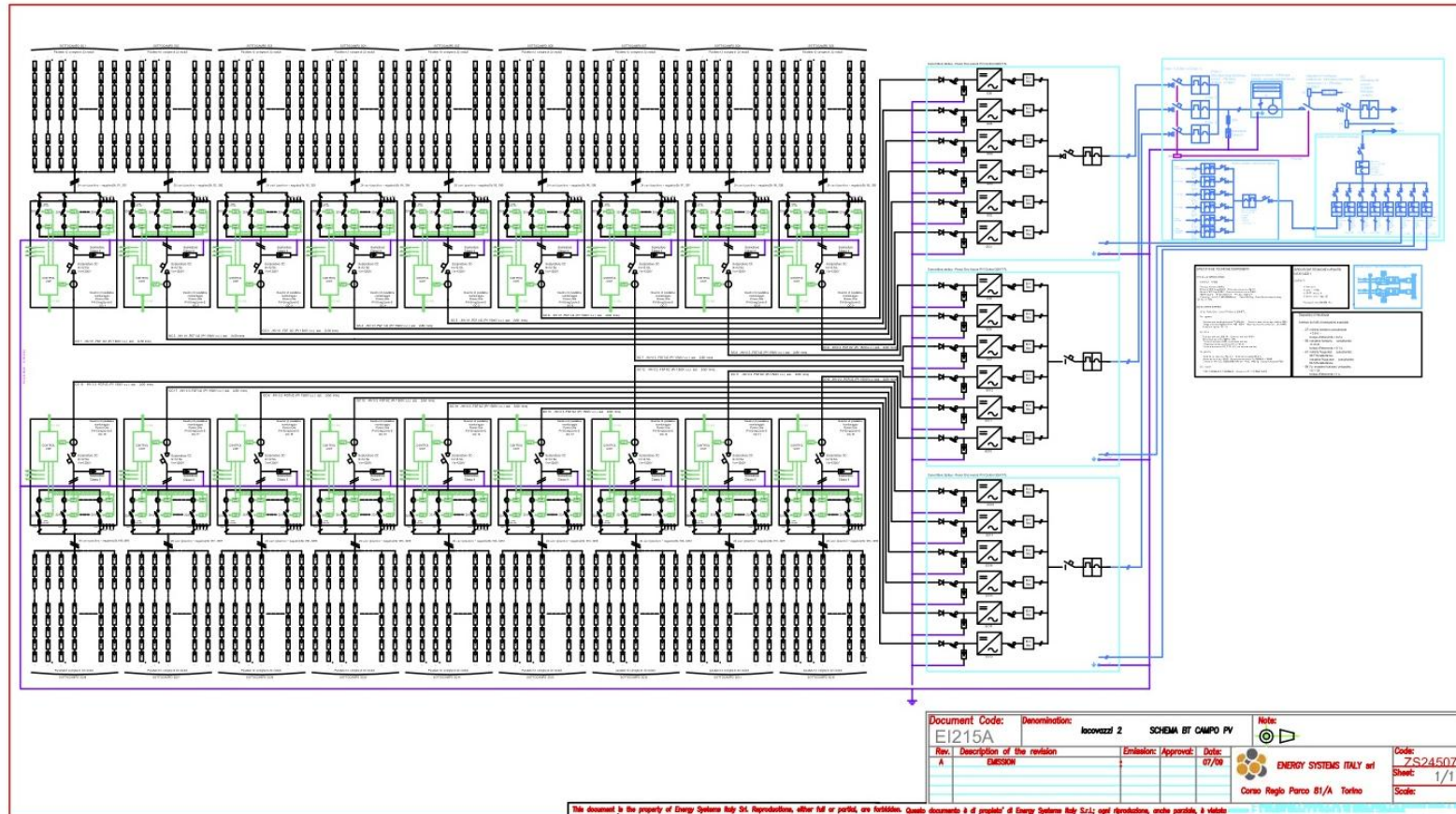
Examples of ESI technical output

PV field design and engineering: Inverters, MV transformers, controllers assembly



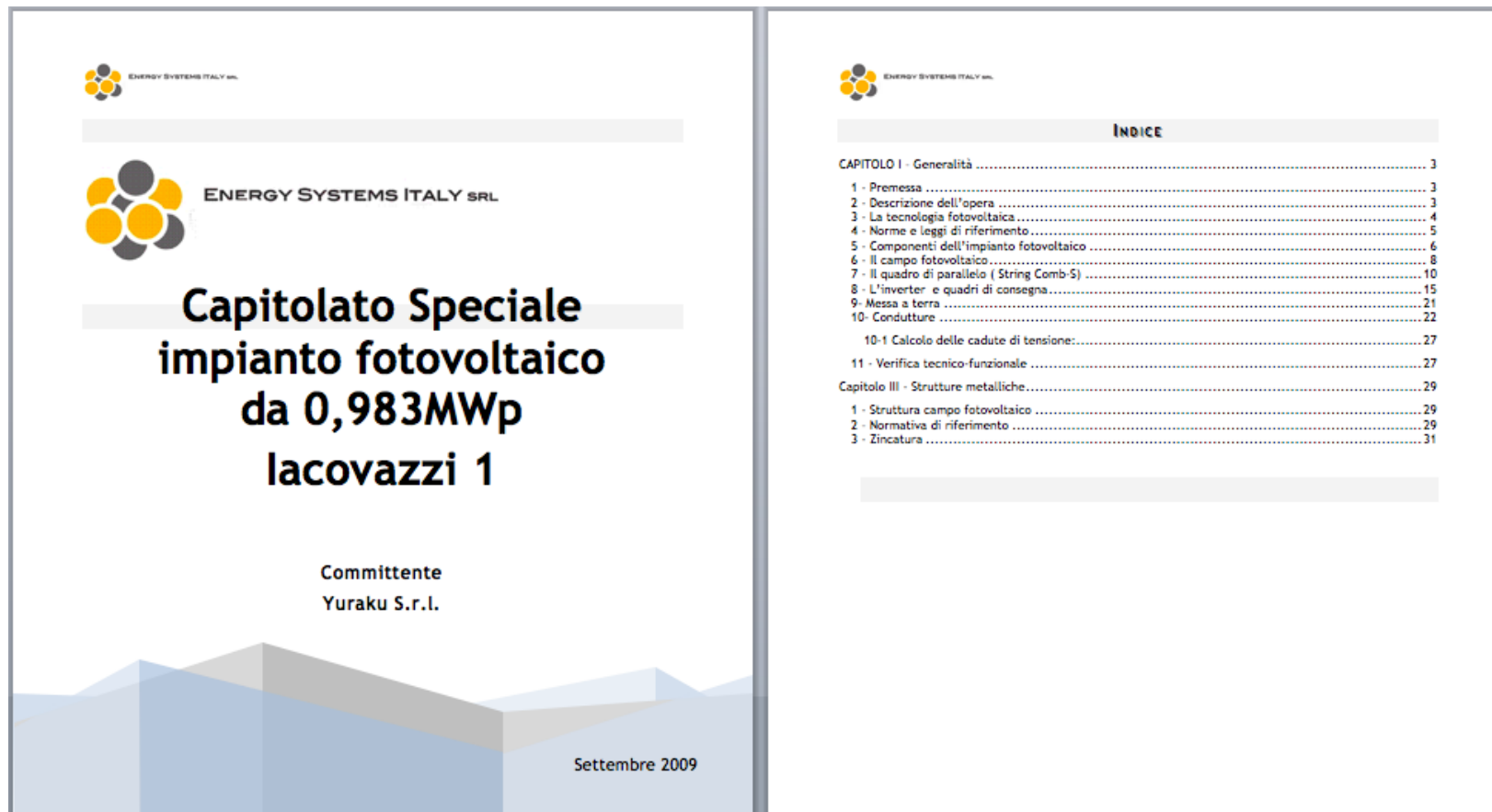
Examples of ESI technical output

PV field design and engineering: LV electrical scheme



Examples of ESI technical output

PV field design and engineering: Construction specifications



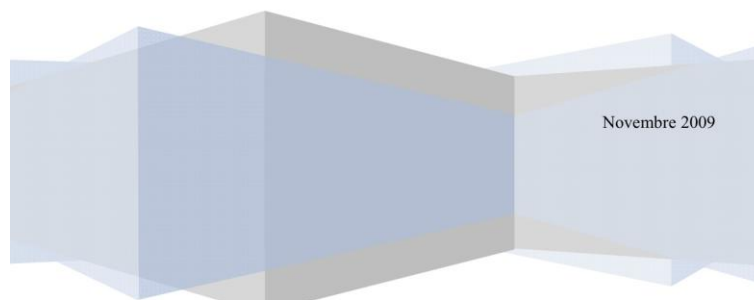
Examples of ESI technical output

PV inverter, controllers, transformers control unit



Relazione Cabina di MT

Committente
Yuraku S.r.l.



Relazione Cabina di MT Iacovazzi

del 29 Novembre 2009

Pag. 1

EPC services

Construction and commissioning

Oversight during construction is absolutely critical in ensuring success and efficiency in PV system performance. Energy Systems has established a networks of engineering offices throughout Italy through which we can rely on a direct presence in the following locations: Florence, Messina, Pescara, Avelino, Terlizzi.

In other southern and central Italian regions we are also present through partners long associated with us and with significant expertise in the PV field.



EPC services

Construction and commissioning

Our experience, built up over decades of activity in different geographical and environmental conditions, is critical in ensuring that the construction of the PV system is done to the highest quality and professional engineering standards.

- preparation of documents covering the construction of the PV systems (Capitolato d'Appalto) – a very critical document in setting the standards of construction
- compliance of construction activities to the project's design, legal and professional standards
- review of quality and adequacy of construction processes
- identification of any non-conforming areas and implementation of corrective actions
- review and inspection of the work carried out by sub-contractors and equipment suppliers to ensure adequacy to professional standards and project design parameters
- testing and commissioning of all work and compliance of all work to the safety legislation (DL 494/96)
- directing, supervising all of the PV plant's testing and commissioning procedures to ensure all systems are working optimally
- instituting any remedial action required with ensuing re-testing and commissioning of the PV system
- supervising GSE during their site inspection
- assisting GSE on its queries during and after the inspection
- supervising of remedial action if required to ensure a rapid award of the incentive scheme



Construction, commissioning: Laterza, Puglia, Italy

In the following slides we aim to show the essential steps in PV field construction.

We show how ESI engineers supervising construction of the PV field act to:

- ensure the field is built to specifications
- to minimise any commissioning issues and reducing time to grid connection

From the establishment of the supporting structures to the layout of cables, constructing a PV field involves thousands of decisions which, if not taken timely and correctly, may result in costly revisions when commissioning comes. The smallest error can be costly in terms of performance and once the PV field is established, any error is time consuming and costly to correct.



Construction, commissioning: Laterza, Puglia, Italy



Construction, commissioning: Laterza, Puglia, Italy



Construction, commissioning: Laterza, Puglia, Italy



ENERGY SYSTEMS ITALY
MAIL.ENERGYSYSTEMS@GMAIL.COM



ENERGY SYSTEMS ITALY SRL

Construction, commissioning: Laterza, Puglia, Italy



ENERGY SYSTEMS ITALY
MAIL.ENERGYSYSTEMS@GMAIL.COM



ENERGY SYSTEMS ITALY SRL

Construction, commissioning: Laterza, Puglia, Italy



Construction, commissioning: Laterza, Puglia, Italy



ENERGY SYSTEMS ITALY
MAIL.ENERGYSYSTEMS@GMAIL.COM

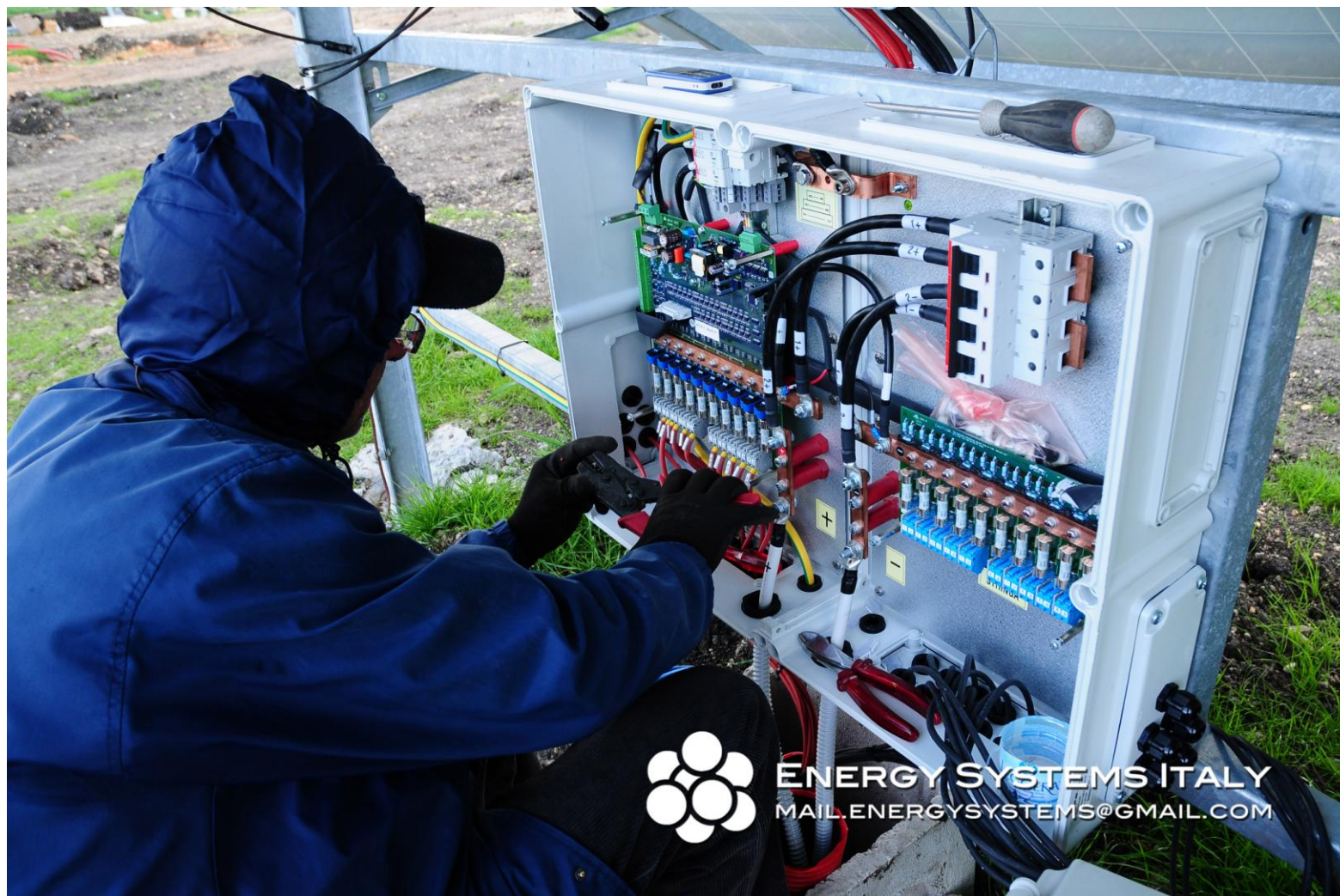


ENERGY SYSTEMS ITALY SRL

Construction, commissioning: Laterza, Puglia, Italy



Construction, commissioning: Laterza, Puglia, Italy



ENERGY SYSTEMS ITALY
MAIL.ENERGYSYSTEMS@GMAIL.COM



ENERGY SYSTEMS ITALY SRL

Construction, commissioning: Laterza, Puglia, Italy



ENERGY SYSTEMS ITALY
MAIL.ENERGYSYSTEMS@GMAIL.COM



ENERGY SYSTEMS ITALY SRL

Construction, commissioning: Laterza, Puglia, Italy



Construction, commissioning: Laterza, Puglia, Italy



ENERGY SYSTEMS ITALY
MAIL.ENERGYSYSTEMS@GMAIL.COM



ENERGY SYSTEMS ITALY SRL

Construction, commissioning: Laterza, Puglia, Italy



*Egr. Dott. Roberto Rizzello,
gradiremmo invitare la S.V. a partecipare alla cerimonia
di inaugurazione del primo campo fotovoltaico Powercom-
Yuraku che si terrà ad Laterza (Taranto) il 15 dicembre
2009.*

RSP

Construction, commissioning: Laterza, Puglia, Italy



Contacts



ENERGY SYSTEMS ITALY SRL
CORSO REGIO PARCO 81/A
10154 TORINO ITALY

PROF. ING. PAOLO REDI
+39 335 5614999
PR.ENERGYSYSTEMS@GMAIL.COM

DR. ROBERTO RIZZELLO
+39 335 6145869
RR.ENERGYSYSTEMS@GMAIL.COM

MICHELE BINA
+39 329 4134849
MB.ENERGYSYSTEMS@GMAIL.COM

Technical director: Prof. Ing. Paolo Redi
Project director: Dott. Roberto Rizzello
Business development director: Michele Bina





ENERGY SYSTEMS ITALY SRL

CORSO REGIO PARCO 81/A

10154 TORINO ITALY

TEL - FAX +39 011 2871581

MAIL.ENERGYSYSTEMS@GMAIL.COM

CODICE FISCALE / PARTITA IVA 10124310011

CAPITALE SOCIALE € 10.000,00 I. V.

REG. IMPR. TORINO N. 10124310011

R.E.A. TORINO N. 1107665

