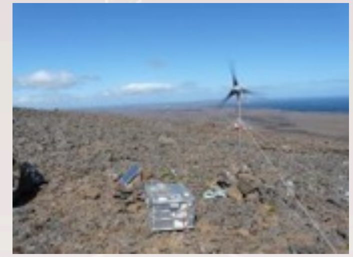
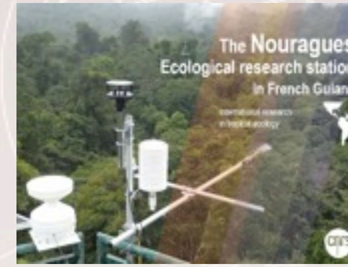



# Solutions for energy units in extreme environments

OLIVIER GILBERT
ENERGIE-SERVICE (FORMER CNRS)
AN EPOS & ACTRIS & ANAEE CONTRIBUTION

Bruxelles, June 2019

ENVRI plus
Supporting environmental research
with integrated solutions
**- the Earth is our lab**

ENERGIE-SERVICE
Electricité - Audit énergétique
Instrumentation scientifique

# A COMMON KNOWLEDGE ON ENERGY

*« The more we share, the better we are »*

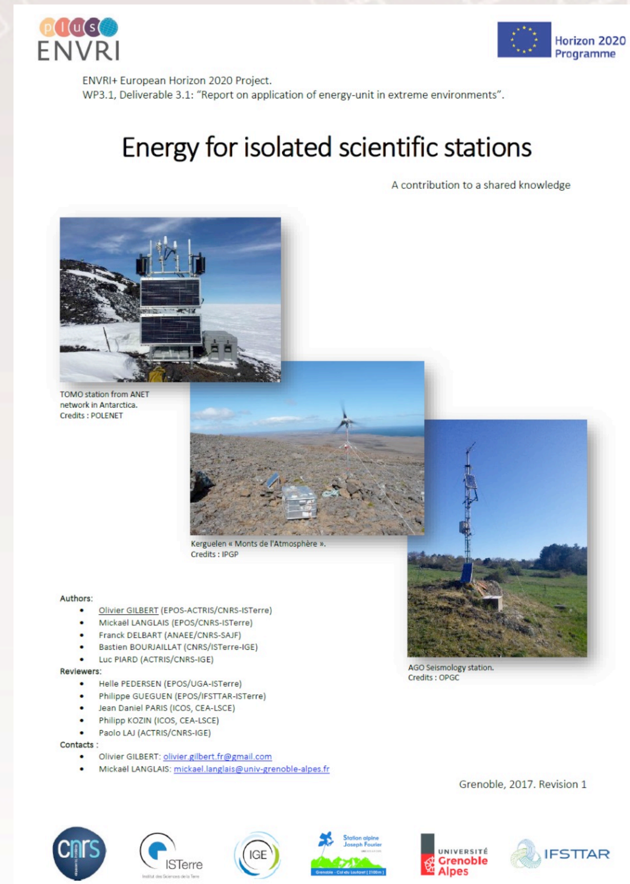
**→ Presentation of a shared technical work done within the ENVRI+ network.**

**As all Research Infrastructures (RIs) are working on Earth sciences (atmosphere, seismology, biology, oceanic observation, glaciology,…) : they need energy to run their on-site measurement stations.**

**Every laboratory, every technical team, produced its own technical solutions to fit their special needs (extremely cold, strong winds, volcano, deep ocean,...)**

**So inside the ENVRI network :**

- **We gathered those knowledges**
- **We selected the most common requirement**
- **We tried to improve technical systems**
- **We spread results and common knowledge to everyone (built by everybody, for everyone)**



ENVRI+ European Horizon 2020 Project.
WP3.1, Deliverable 3.1: "Report on application of energy-unit in extreme environments".

Energy for isolated scientific stations

A contribution to a shared knowledge

TOMO station from ANET network in Antarctica. Credits : POLENET

Kerguelen « Monts de l'Atmosphère ». Credits : IPGP

AGO Seismology station. Credits : OPGC

Authors:
- Olivier GILBERT (EPOS-ACTRIS/CNRS-ISTerre)
- Mickaël LANGLAIS (EPOS/CNRS-ISTerre)
- Franck DELBART (ANAEE/CNRS-SAJF)
- Bastien BOURJAILLAT (CNRS/ISTerre-IGE)
- Luc PIARD (ACTRIS/CNRS-IGE)

Reviewers:
- Helle PEDERSEN (EPOS/UGA-ISTerre)
- Philippe GUEGUEN (EPOS/IFSTTAR-ISTerre)
- Jean Daniel PARIS (ICOS, CEA-LSCE)
- Philipp KOZIN (ICOS, CEA-LSCE)
- Paolo LAJ (ACTRIS/CNRS-IGE)

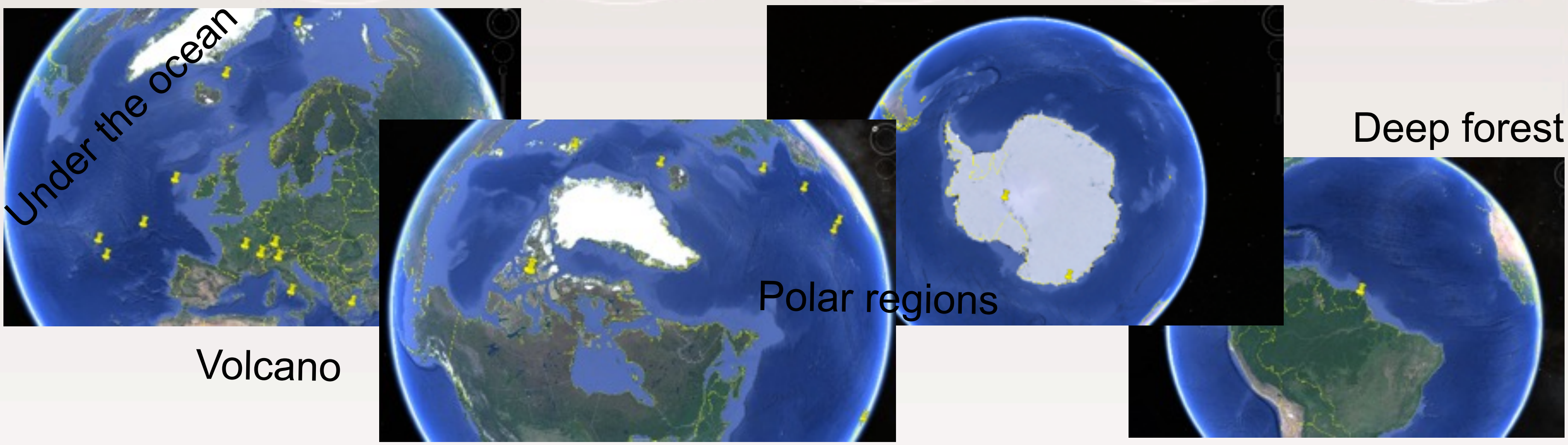
Contacts :
- Olivier GILBERT: olivier.gilbert.fr@gmail.com
- Mickaël LANGLAIS: mickael.langlais@univ-grenoble-alpes.fr

Grenoble, 2017. Revision 1

*Deliverable D3.1 :*
*Report on application of energy-unit in extreme Environments*

# DIFFERENT SCIENCES, DIFFERENT NEEDS

- Scientific measurement stations from all other the Earth. Terrestrial and oceanic sites.

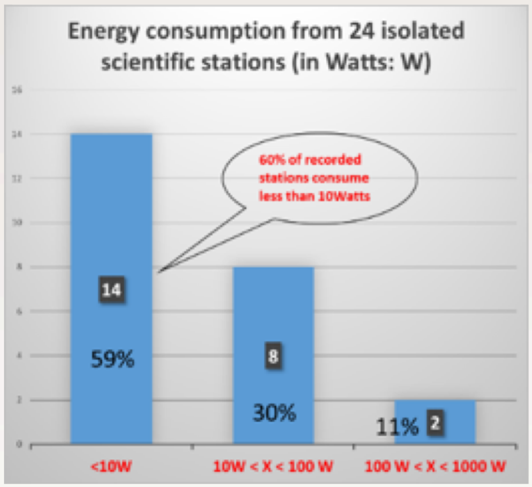


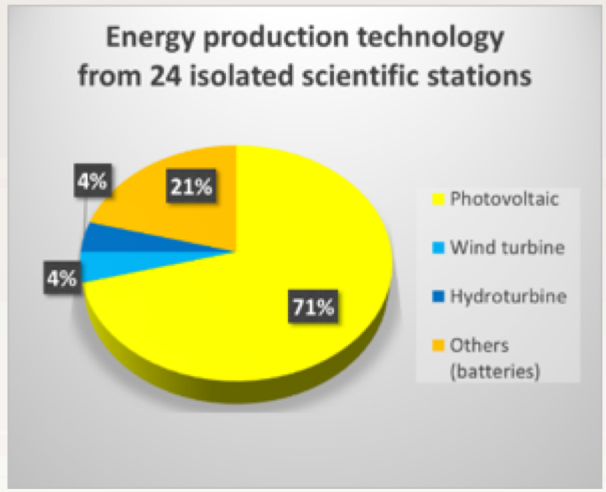

→ We focused on 25 isolated scientific stations representative of larger networks (1 typical of each RI) facing very different environmental conditions.

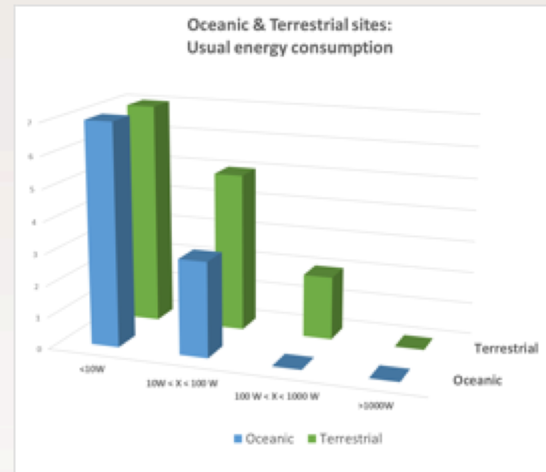
[And more...]

# FIRST: WE ASK

- What do you need ? In terms of energy consumption.
- What do you usually use ? to produce and store this energy.



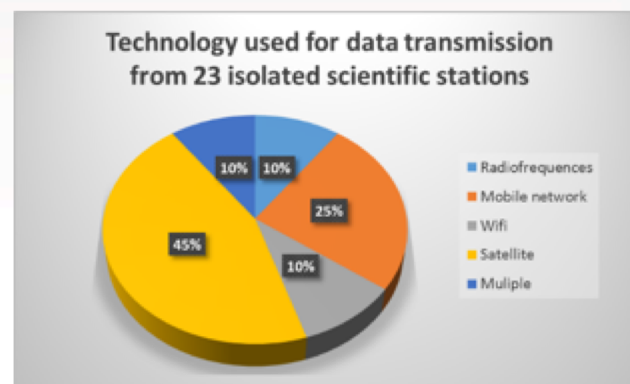




Average needs on energy :

- ~ 10W
- Solar panels, windturbines,
- Lead-acid and lithium batteries

Also ask on data transmissions

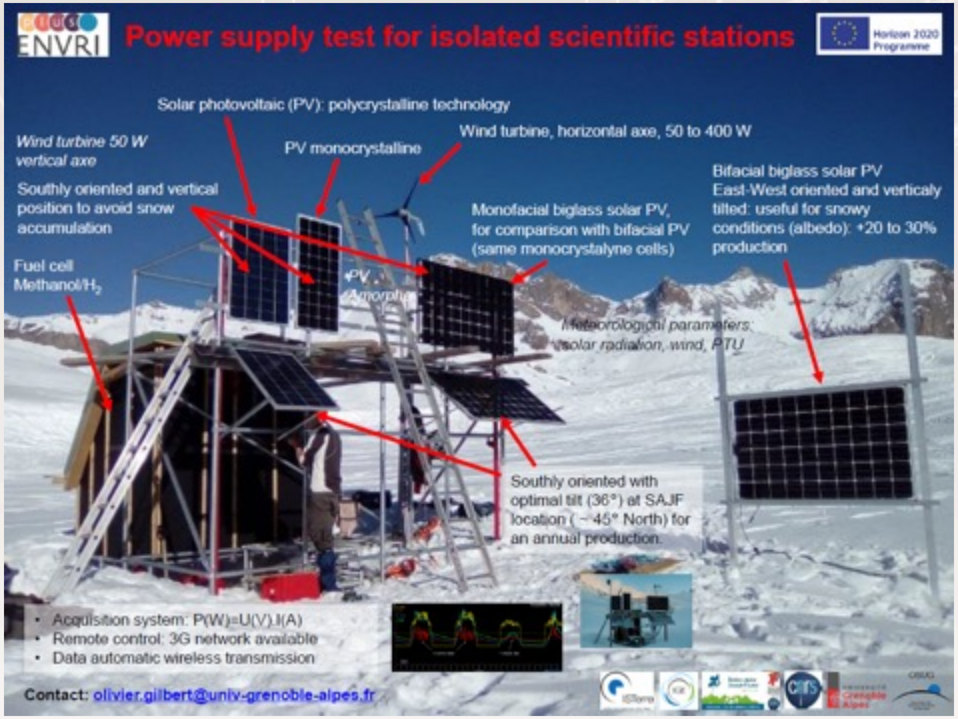


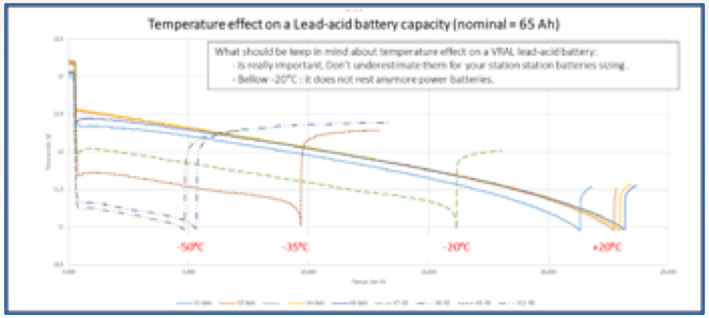

H2020 Project

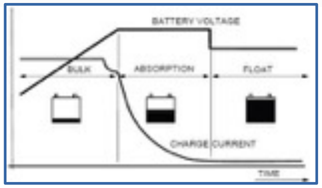
ENVRI plus

# WE TESTED AND IMPROVED

- The most used solutions to fits the most current needs, on :
  - Energy production
  - Energy storage
  - Energy regulation
  - Consumption minimization
- Under cold, snow and wind.



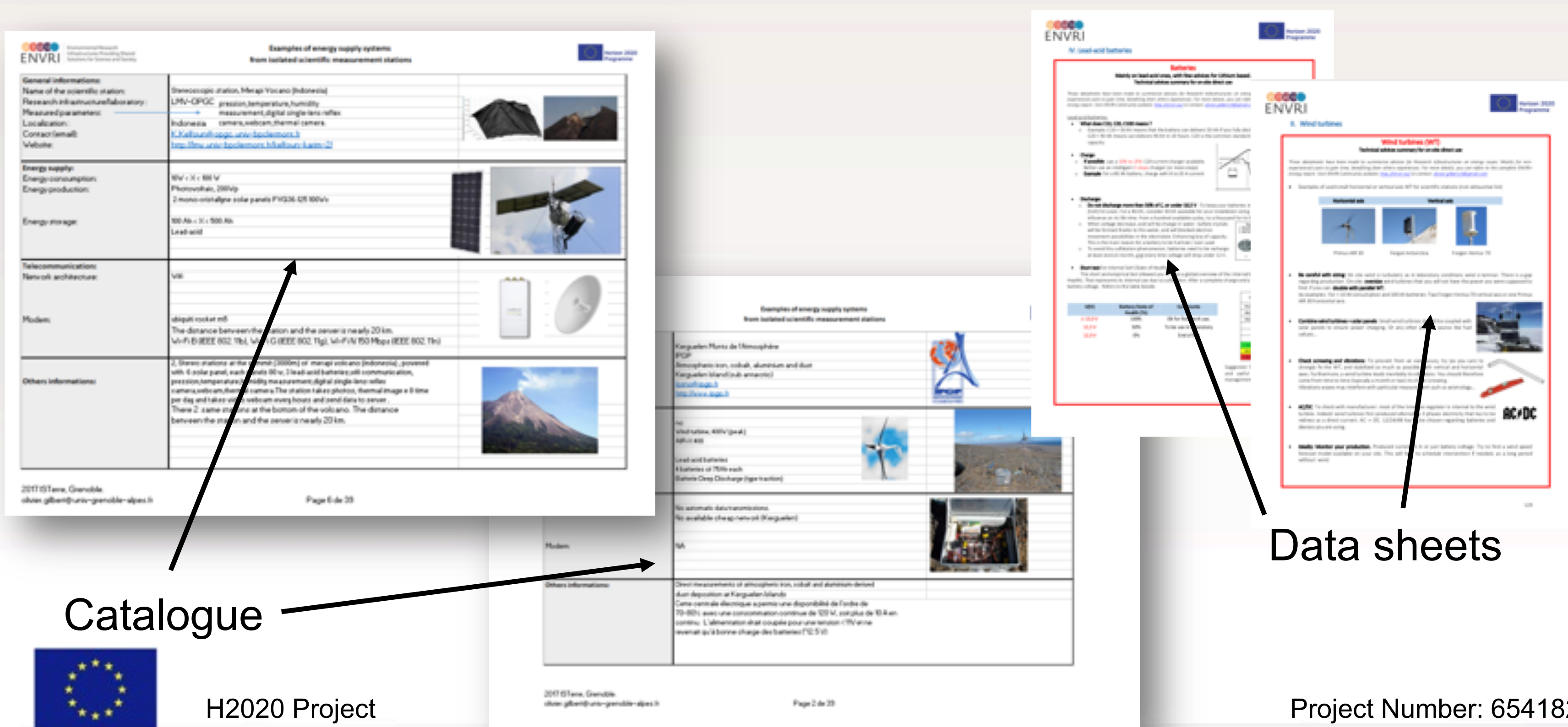





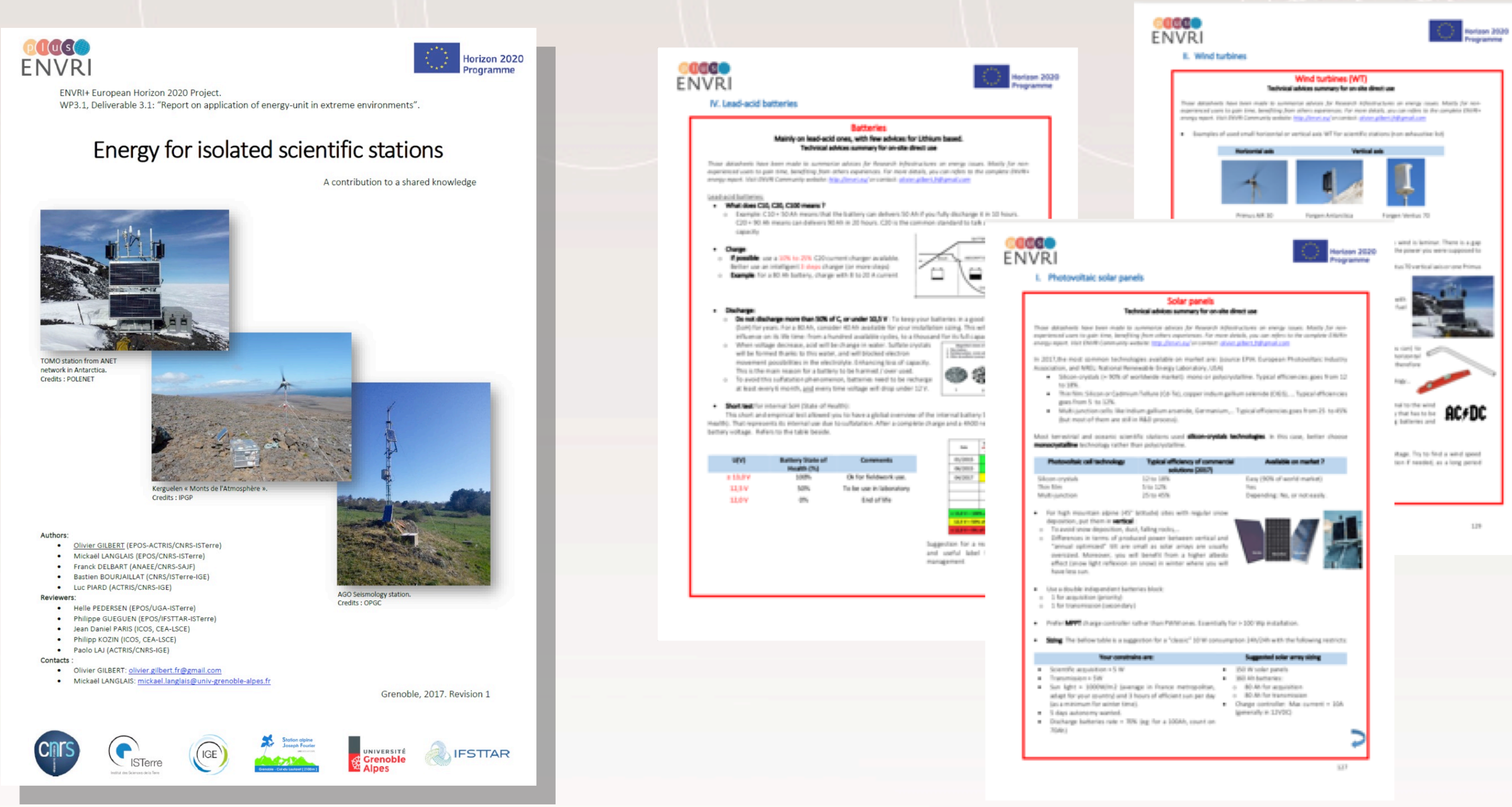
H2020 Project

# WE GATHERED

- Technical informations on energy for autonomous stations, and data tele-transmission.
    - → A **catalogue of operational solutions** : 1 page = 1 operational solution, with technical contacts for more information.
    - → What you should know if you need an autonomous energy system.



# WE SHARED BACK



ENVRI+ European Horizon 2020 Project.
WP3.1, Deliverable 3.1: "Report on application of energy-unit in extreme environments".

Energy for isolated scientific stations

A contribution to a shared knowledge

TOMO station from ANET network in Antarctica.
Credits : POLENET

Kerguelen « Monts de l'Atmosphère ».
Credits : IPGP

AGO Seismology station.
Credits : OPGC


Authors:
- Olivier GILBERT (EPOS-ACTRIS/CNRS-ISTerre)
- Mickaël LANGLAIS (EPOS/CNRS-ISTerre)
- Franck DELBART (ANAEE/CNRS-SAJF)
- Bastien BOURJAILLAT (CNRS/ISTerre-IGE)
- Luc PIARD (ACTRIS/CNRS-IGE)

Reviewers:
- Helle PEDERSEN (EPOS/UGA-ISTerre)
- Philippe GUEGUEN (EPOS/IFSTTAR-ISTerre)
- Jean Daniel PARIS (ICOS, CEA-LSCE)
- Philipp KOZIN (ICOS, CEA-LSCE)
- Paolo LAJ (ACTRIS/CNRS-IGE)

Contacts :
- Olivier GILBERT: olivier.gilbert.fr@gmail.com
- Mickaël LANGLAIS: mickael.langlais@univ-grenoble-alpes.fr


Grenoble, 2017. Revision 1



Available on-line @:
http://www.envriplus.eu/wp-content/uploads/2015/08/D3.1.pdf

# THANK YOU FOR YOUR ATTENTION

*« Not to reinvent the wheel »*

→ The power of a network.


For more information or technical assistance :

Olivier GILBERT

Energie-Service

→ contact@energie-service.info

→ olivier.gilbert.fr@gmail.com


ENERGIE-SERVICE

Electricité - Audit énergétique

Instrumentation scientifique