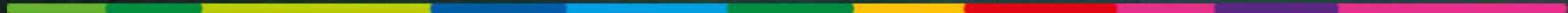




# Ineo

## Energy & Systems



Chapter 1

Presentation  
& key figures

Chapter 2

Business lines &  
expertises

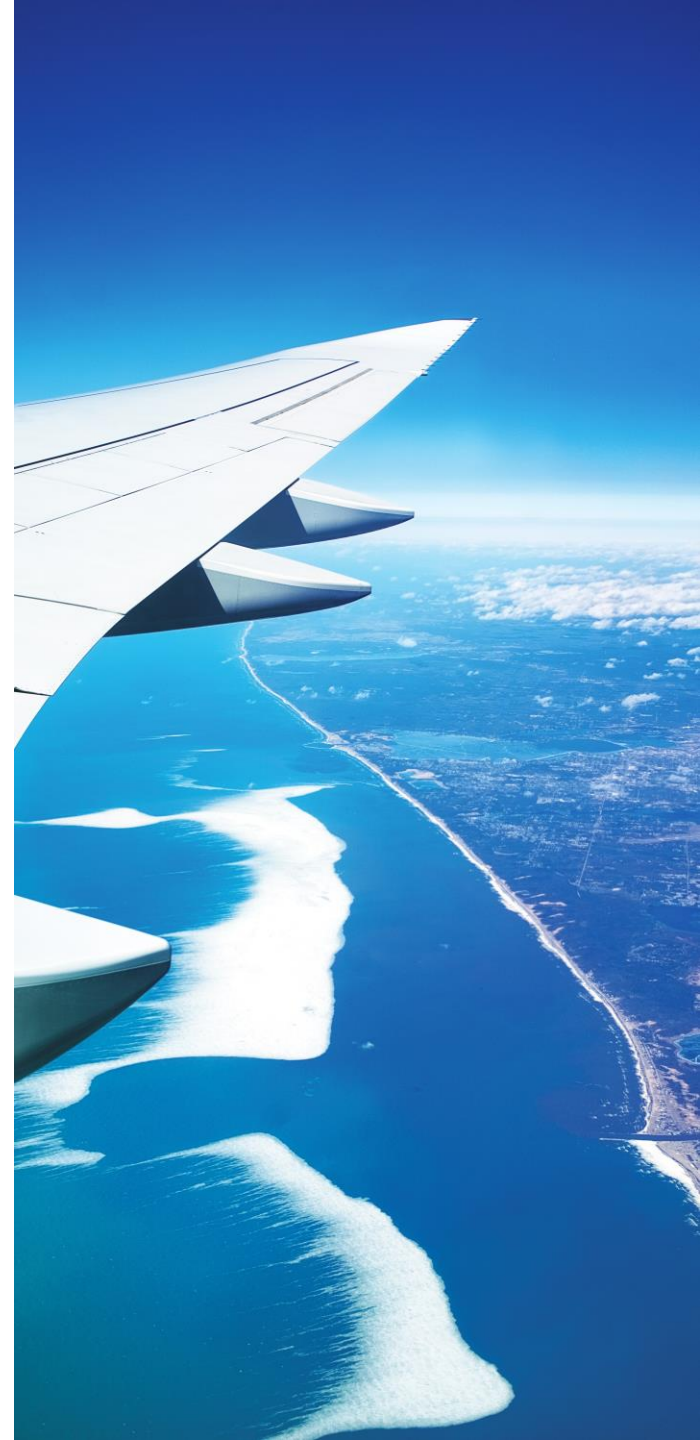


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# 01

## Presentation & key figures

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**160,000**

employees

**€60.6 billion**

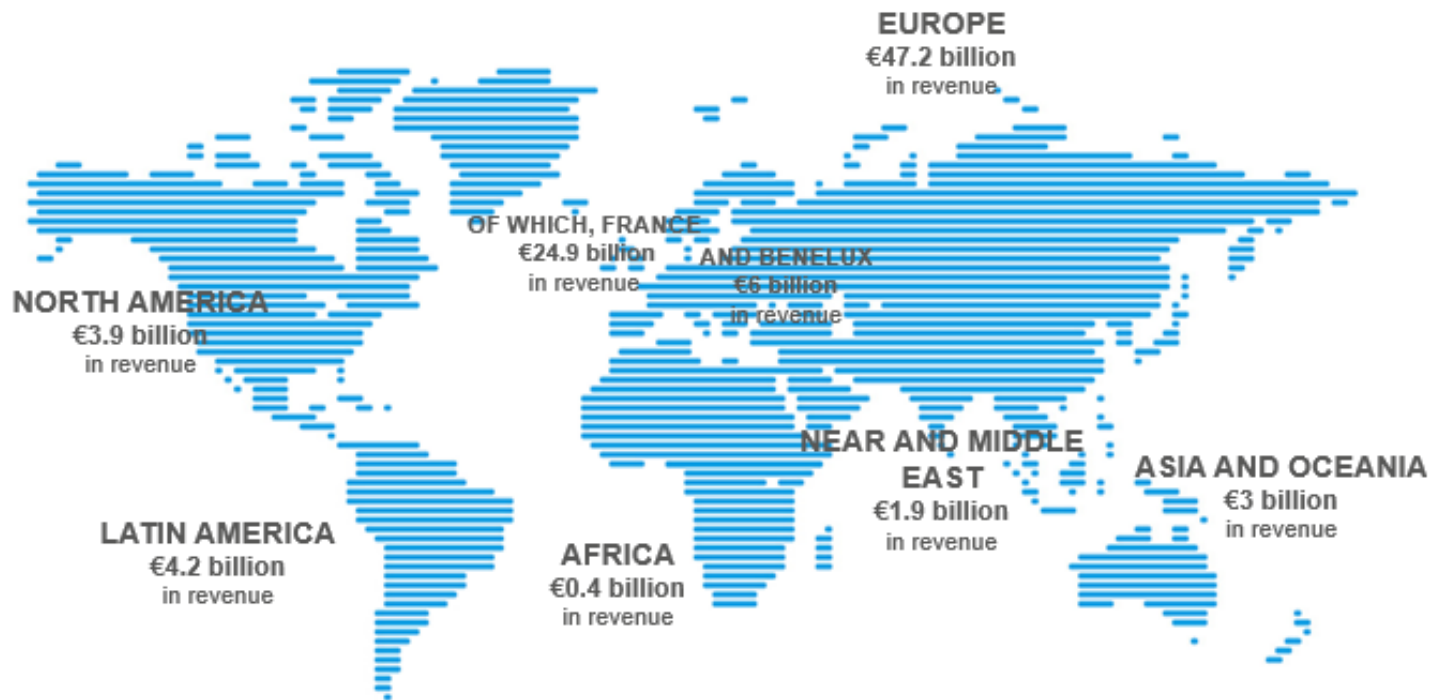
in revenue

**€2.5 billion**

recurring profit after tax

**€11 billion**

of planned investment in growth in 2019-2021



\*on 31/12/2018

## Production

- **The world's leading** independent power producer (IPP)
- **104.3 GW** installed
- **93%** of low CO2-emitting activities
- **The leader in wind and solar** power in France



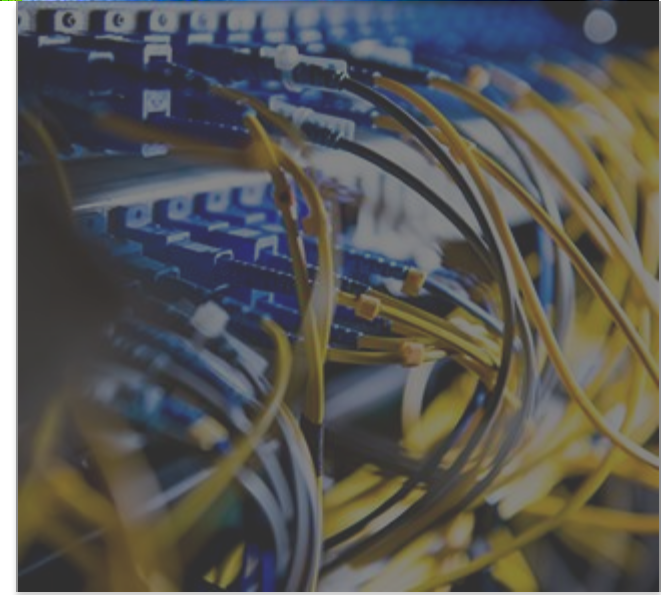
## Customer solutions

- **24 million** contracts worldwide
- **N°1** worldwide in cold networks
- **N°2** worldwide in recharging systems for electric mobility
- **N°1** worldwide in micro-grids



## Distribution

- **The European leader** in gas transportation and distribution
- **4,500 km** of gas pipelines in Brazil
- **The first** demonstrator of the injection of **green hydrogen** into the gas distribution network in France
- **A 600 km** electricity grid between northern and central Chile





**60,6 bn€**  
Sales Turnover

**20**  
Countries

**160 000**  
Employees

## Customer Solutions

Business to Business  
Business to Consumer  
Business to Territories

**BU France BtoB :**

**7,7 bn€**  
Sales\*

**42,500**  
Employees

**900**  
Facilities

## Distribution

## Production

**ENGIE Axima**

**1,8 bn€**  
Turnover\*

**10,000**  
Employees

**ENDEL ENGIE**

**750 m€**  
Turnover\*

**7,000**  
Employees

**ENGIE Ineo**

**2,4 bn€**  
Turnover\*

**15,000**  
Employees

**ENGIE Cofely**

**2,8 bn€**  
Turnover\*

**12,000**  
Employees

\* Sales made in 2018

# INEO E&S IN A BLINK OF THE EYE

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AERONAUTICS

ENERGY

SECURITY

SERVICE & MAINTENANCE

**273** employees

**€72 M€**

sales turnover in 2018



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# 02

## Business lines & expertises

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## Aeronautics

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## Energy

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## Security

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## Service & Maintenance

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# ENERGY

SUPPORTING DEVELOPMENT OF  
RENEWABLE ENERGIES

GUARANTYING CONTINUITY OF SERVICES

IMPROVING THE RATE OF AVAILABILITY OF  
FACILITIES

DESIGNING AND DEPLOYING SMART GRIDS

## Our expertise

Construction, renovation and maintenance of high voltage and very high voltage lines, transformer and distribution stations, management and instrumentation and control, energy management, Smart Grids, lightning detection and protection, installation and integration of photovoltaic solutions, construction of windfarm infrastructures, renovation of hydroelectric structures, assisting nuclear operators, etc.





## Power plants

Moorea  
(French Polynesia)

Studies, supplies and installation of a new power plant of 16.5 MW

**16,5 MW**



## Power lines

Mauritania

**225/90/30 kV**

Construction of two substations  
Construction of the link between 2 substations and the interconnection to the existing network



## Distribution & dispatching

Dispatching  
Substations 30/15 kV  
Overhead and underground lines  
(medium and low voltage)

**167 km HV lines  
84 km LV lines**



# SECURITY

**Improve the security of equipment and citizens**

**Secure the territories and infrastructures**

**Monitor, dissuade, prevent and act**

**Anticipate et manage major risks**

**Strengthen operational capacities**

**Strengthen the operational capacity**

**Vital operators, sensitive industrial sites, transport operators, civilian safety**

## **Our expertise**

Video protection devices, training of operators, access control, urban supervision center, hyper vision, lightning protection, deployment of exceptional additional means, warning system for populations, help for intervention, vulnerability audits, secure information and communication systems, maintenance, etc.







## Security of sensitive sites

GRTgaz

Securing all sites classified as sensitive  
across national territory  
Centralized telesurveillance system  
(ITS)

**36 sites**

## Offshore

TOTAL E&P

**20 systems**

Commissioning of a security system  
and offshore solutions  
on the OFON field

## Airport security

Bordeaux-Mérignac Airport

Installation and commissioning of a  
security system for the Bordeaux-  
Mérignac airport

**211 cameras**

# SERVICE & MAINTENANCE

IMPROVING ECONOMIC AND ENERGY PERFORMANCE IN BUILDINGS AND FACILITIES

GUARANTEEING DURABILITY OF THE FACILITIES

## Our expertise

Installation and distribution of electricity, lighting, technical management of the building, call centre, fire and lightning protection, telephone system, IT and communications systems, computer networks, datacentre, rooms for meetings and video conferences, supervision, hypervision, management of energy, Smart Grid, telephone system, IT networks, Video, Data, Images and Computer-Assisted Maintenance Management, multi-media installations and terminals, access control, video surveillance, etc.





## Maintenance of safety conditions

Major energy distribution operator  
(2012-2017)

Outsourcing maintenance for the protection of sensitive industrial sites

**5 years of maintenance**  
**36 maintained sites**



## Support for telephony system

RTE

**7 years of maintenance**  
**16 maintained sites**

Telephone assistance for troubleshooting and monitoring of equipment configurations



## VCS system

DGAC – DSNA  
(2000-2009)

Long-term sustainability of VCS system

**6 200 monitored equipment**



# AERONAUTICS

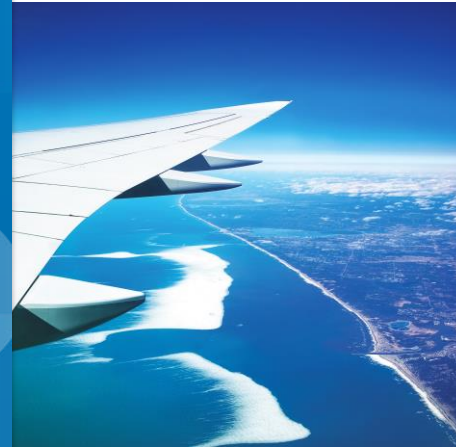
MANAGING CRITICAL SUPPLY CHAINS  
FROM ONE END TO THE OTHER

MAINTAINING AND OPERATING EQUIPMENT  
WITH A COMMITMENT ON RESULTS AND  
GUARANTEE OF AVAILABILITY

SECURING INFRASTRUCTURES, IT  
SYSTEMS AND COMMUNICATIONS  
SYSTEMS

## Our expertise

Management of the supply chain, prevention of obsolescence of equipment, maintenance and operation of equipment, securing of infrastructures and IT systems, ATC / ATM solutions for control towers and control centers (VCS, ITWP), ATC mobile towers, ATC tower simulators, telecommunication and network infrastructures, remote transmit / receive centers, runway lightning systems, Nav aids, weather conditions sensors, powerplant, etc.







## Power plants

Ivato International Airport  
(Madagascar)

Rehabilitation of the power plant of the  
airport

**2 x 400 kVa**



## Airfield lighting

Abidjan International Airport  
(Côte d'Ivoire)

**3000-meter  
runway**

### Key figures

120 000 m primary lighting cable  
20 regulators  
900 traffic lights



## Nav aids

VOR/DME of Ollombo  
(Congo)

**6 months  
of realization**



## VSAT Telecom

South America

ICAO (2013 – 2015)  
Renovation of the telecommunication  
network REDDIG

**13**  
countries

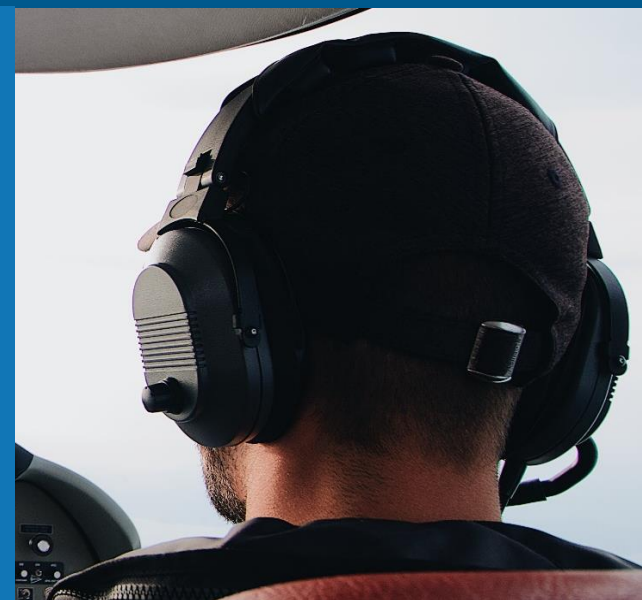


## Remote VHF stations

Africa

**17 countries**  
**72 remote stations**

ASECNA (since 1998)  
Installation of remote VSAT / VHF  
stations in Africa



## HF equipment

Africa

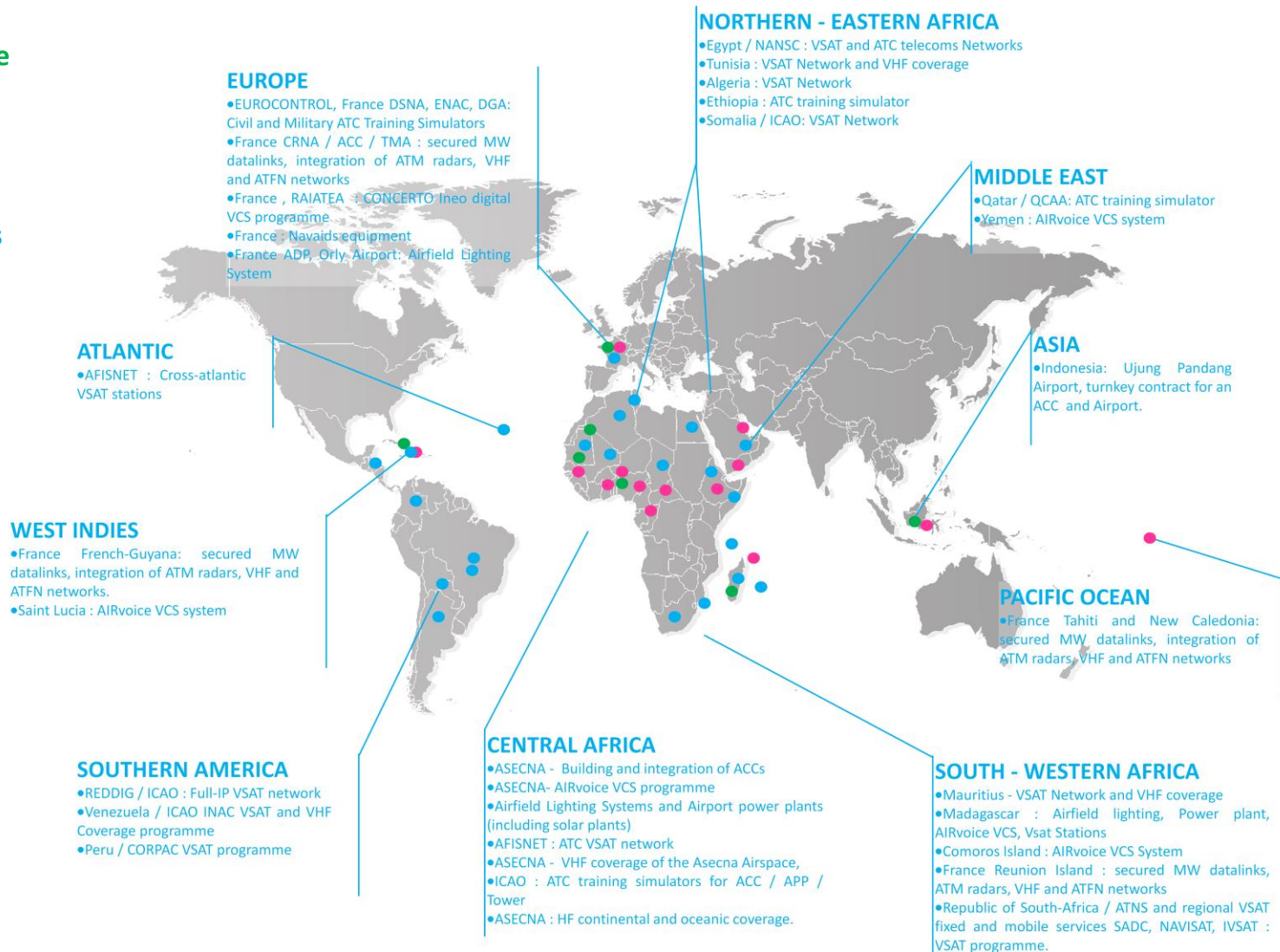
ASECNA (since 2016)  
Renovation of HF equipment

**10**  
countries

**Airside Infrastructure**

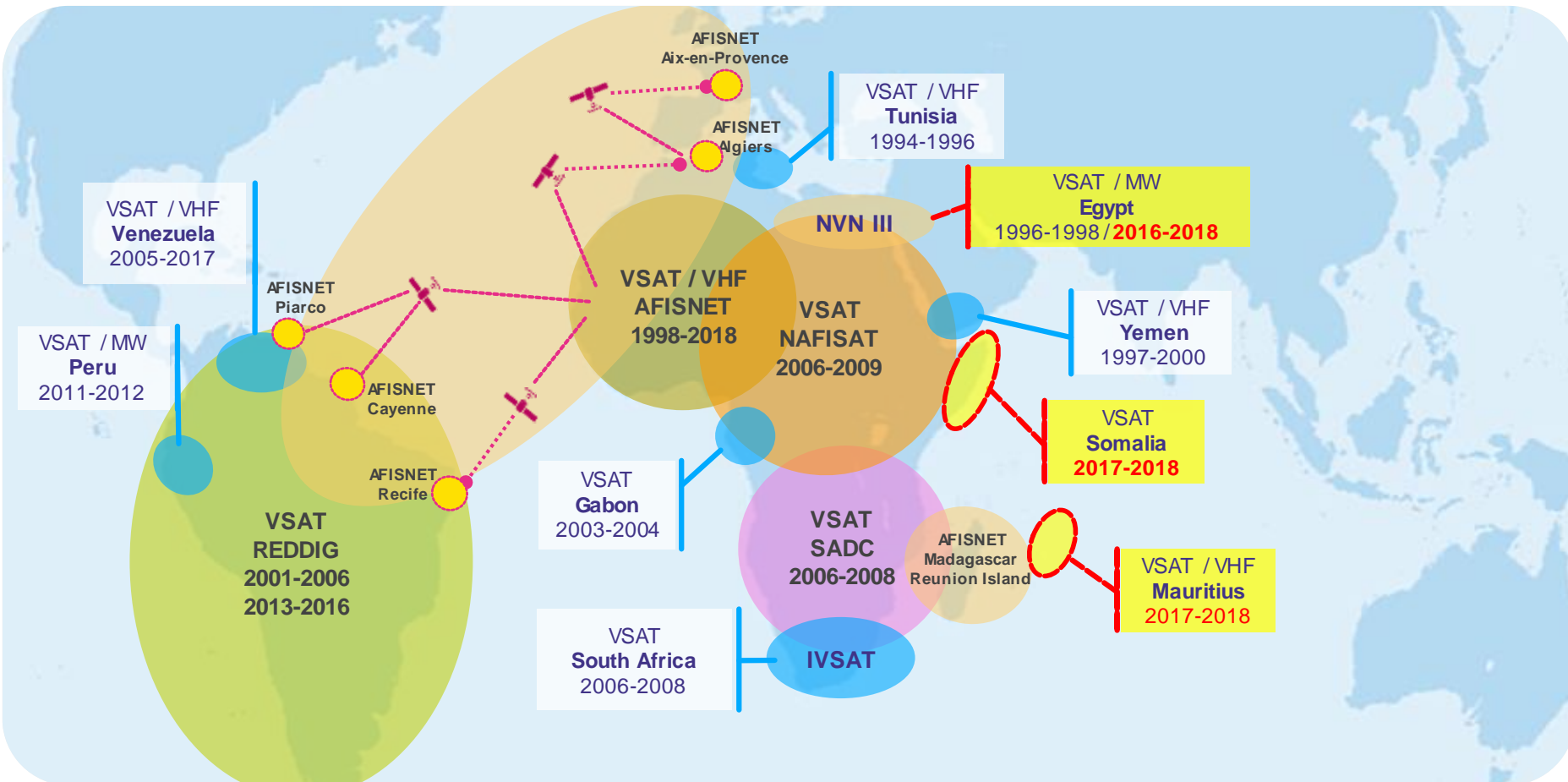
**Air Traffic Control**

**ATC Networks and Telecommunications**



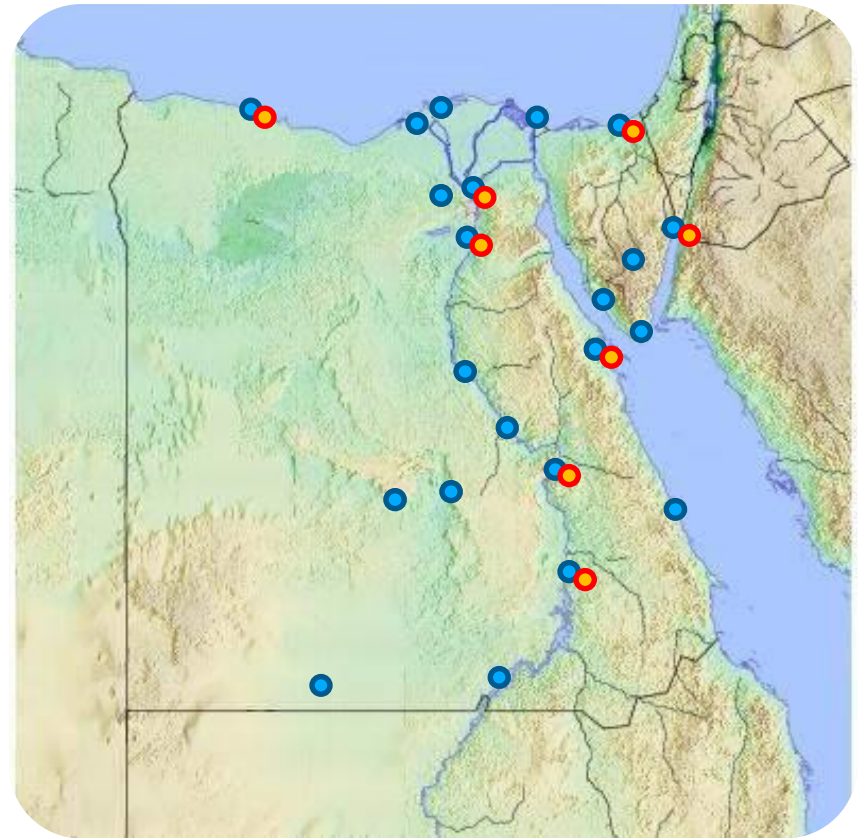


## INEO E&S has a wide expertise in design and commissioning of ATC VSAT networks





- ✓ 22 VSAT stations ○
- ✓ 8 microwave links ●



### Technologies

- **MF-TDMA mesh network**  
Hub redundancy
- **Frame-Relay (legacy services) & IP**

### Services

- **Analog VHF**
- **Analog Hotline & PBX line**
- **Serial AFTN**
- **Serial and IP Radar stream**
- **IP NMS**
- **VoIP Order Wire**

## Design and redundancy

### ➤ **New NVN III network has two independent A&B channels:**

- Redundant RF unit with switching unit
- Telecom devices (modems, switches, multiplexors) are redundant

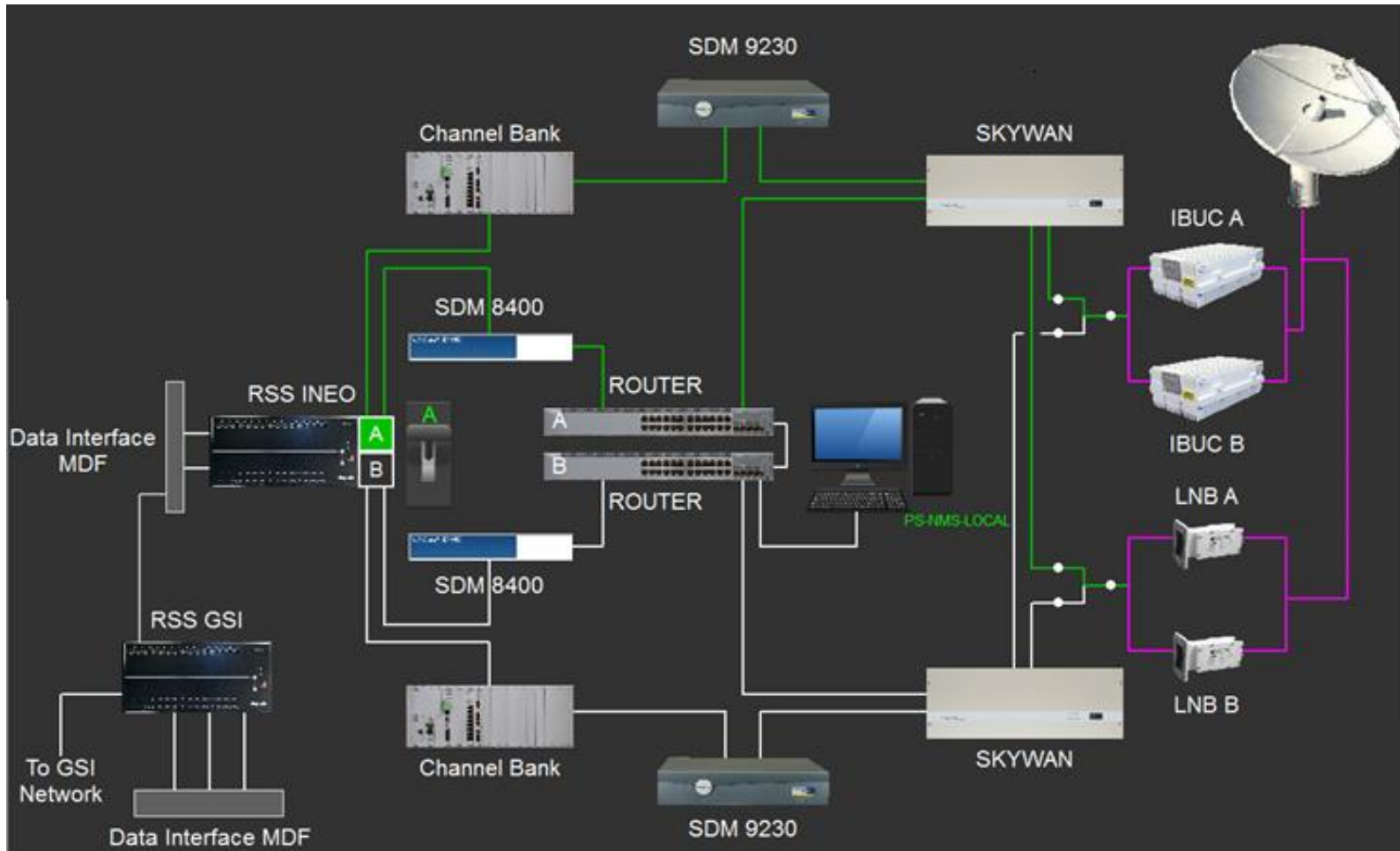
### ➤ **A channel is the nominal:**

- In case of failure there is an automatic switching from channel A to B
- It is only a manual switching (operator decision) from B to A

### ➤ **For legacy services, old NVN II system is a backup for NVN III network via a manual Redundant Switching System (RSS)**

- NVN II is operating through Intelsat
- NVN III network is fully independent, and is operating on Eutelsat (new VSAT antennas)

## Design and redundancy

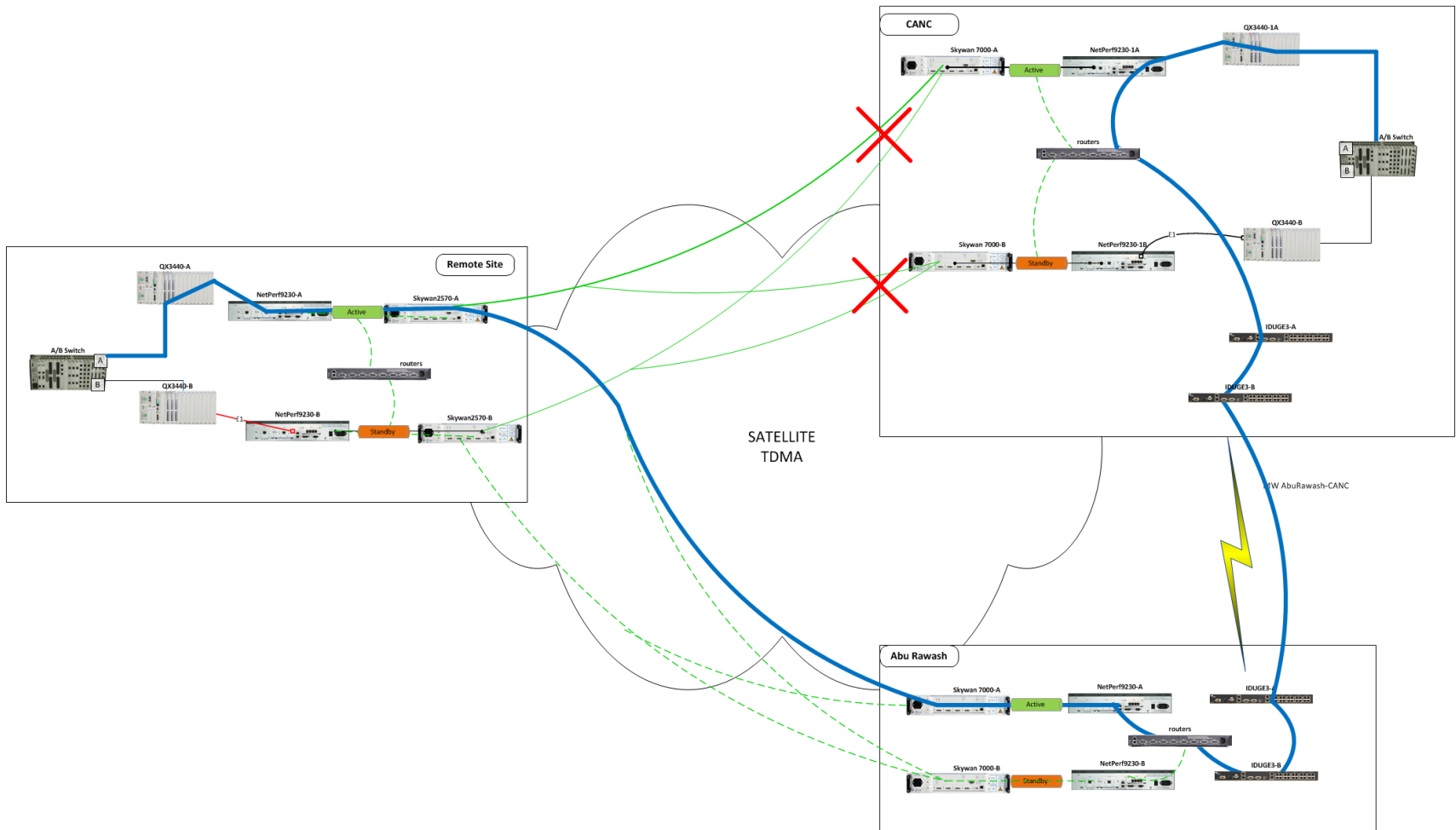




### Design and redundancy

- **Main streams are between Cairo and the remote stations**
  
- **To avoid a point of failure in case of major breakdown on VSAT system at Cairo (antenna, RF, modems) an additional redundancy is offered**
  - **A redundancy via microwave link for the main site Cairo via Abu Rawash (30 km from Cairo)**
    1. On TDMA network, traffic is routed from remote stations to Abu Rawash
    2. Traffic is routed on microwave link up to Cairo

## Design and redundancy



## Design and redundancy – Main challenges

### ➤ Key issues at stake

- Ensuring the redundancy of Cairo main site via Abu Rawash
- Managing VSAT main and backup modems
- Designing different scenarios according to pre-defined faults to switch automatically from channel A to B
- No automatic switching from B to A avoiding the system to toggle

### ➤ **The more redundant the system, the more demanding it is to maintain the system and isolate the fault**

## ➤ Continuous improvement of your safety

82%

of the downtime resulting  
from an attack  
last more than 24 hours

Source KASPERSKY

35%

of industrial network failures  
are the result of malicious  
programs

Source KASPERSKY

## ➤ 2017 Report

81%

of companies attacked

Source Microsoft

880 k\$

average cost of a security  
breach

Source Microsoft

9 weeks

average time for service  
restoration

Source Microsoft



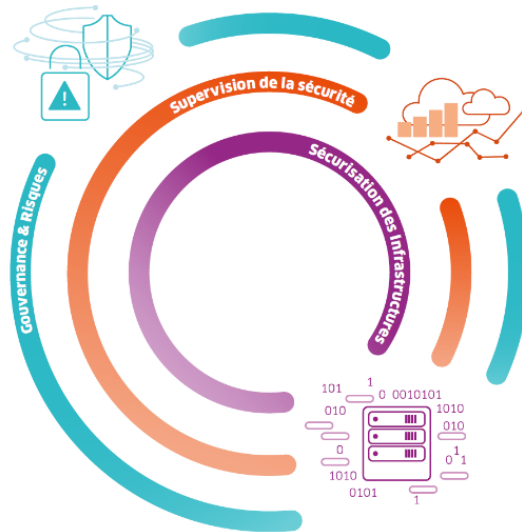
## An INEO entity

### Engie Ineo Cyber Competence Center

A team of 20 engineers and experts

## GOVERNANCE & RISKS

- ✓ Security Organization
- ✓ Advice and support
- ✓ Risk analysis and monitoring
- ✓ Audit and control
- ✓ Awareness
- ✓ Advice to the regulatory compliance PDIS & I1901
- ✓ Homologation / Certification



## SECURITY SUPERVISION

- ✓ Setting up Cyberprotect as an external SOC service
- ✓ Definition of the business scope to be placed under surveillance
- ✓ Support in the definition of events to collect
- ✓ Define processes for incident response
- ✓ IBM Resilient support and advice for incident response
- ✓ Maintenance in Security Conditions

## What do we propose?

A global approach to the OT/IT security

Intervention on the entire value chain

## SECURING INFRASTRUCTURE

- ✓ Secure architecture design (transport, telecommunications, energy, smart building, smart cities, ...)
- ✓ Security products comparison (IAM, Firewall, IDS, IPS, End Point Security, SIEM)
- ✓ Security solution deployment (Proxy, hardened environment, Firewall, Data Protection, SIEM, ...)

# Ineo

## Energy & Systems



### YOUR CONTACT

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Hop TON THAT

+33 1 39 26 15 30

[hop.tonthat@engie.com](mailto:hop.tonthat@engie.com)

### INEO Energy & Systems

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23 rue du Général Valerie Andre  
INOVEL Parc sud  
78140 VELIZY VILLACOUBLAY

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