Edge computing
AC & DC Loads + 380Vdc distribution

Workshop 4

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Belgium, Luxembourg, China, India, United States, United Kingdom, France, Germany, United Arab Emirates, Russia, Malaysia, Australia.

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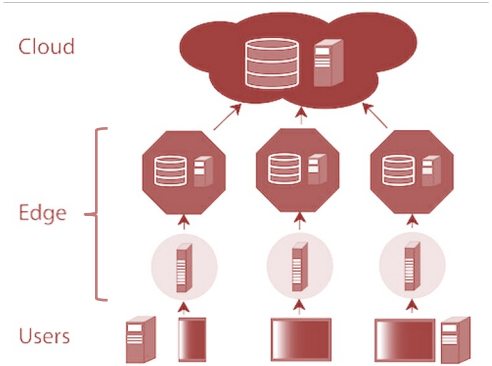
Flexible and smart solutions for edge computing

- Datacenter Challenges
- CE+T Solutions
- Use cases:
  - Use case 1: Optical node
  - Use case 2: Edge datacenter
  - Use case 3: Edge cable landing station

INTRODUCTION

About

- **Edge computing** is “a **distributed** computing paradigm that brings computation and data storage **closer** to the sources of data. This is expected to **improve response times** and **save bandwidth**.”
- **Decentralization** of computing devices and their respective critical back-up **assets**.



Infrastructure model

	Micro Edge	Distributed Edge Data Center	Regional Edge Data Center
Location	Enterprise site (e.g. retail, factory floor, IT closet, municipalities)	Enterprise site (e.g. warehouse, office), telecoms site, parking lot, tier 2/3 city	Tier 2/3 city
# of racks	0-5 racks	5-20 racks	20+ racks
Power	**Up to 20kW**	**Up to 200 kW**	Up to 1MW
External environment	IT closet, commercial & office, harsh & rugged	Harsh & rugged, Commercial & office, conditioned & controlled	Conditioned & controlled
Edge Infrastructure Provider	Hardware OEM, data center provider, telecoms operator or in-house solution within enterprise/government	Colocation provider, public cloud provider, telecoms operator	Colocation provider, public cloud provider
Expected Deployments	Hundreds of thousands	Thousands	Hundreds

CHALLENGES

Challenges [1/2]

- **The CAPEX of a datacentre is huge, time to market is key!**
  Avoid unnecessary investments at the early stage.

- **Find qualified and trained operators is complex.**
  Maintenance requires a lot of competences.

- **Planning maintenance operations is always risky & complex.**
  And even more in colocation data centres.

- **The backup takes up the space you better dedicate to IT.**
  UPS take about 20% of the building space.

Challenges [2/2]

- **Redundancy implies oversized grid connections.**
  Each connection costs a lot and is not necessarily available.

- **Over-provisioning assets to meet capacity and resilience.**
  A lot of stranded power recoverable for extra revenue.

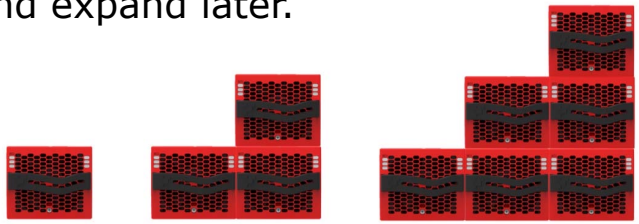
- **Higher availability requires higher investment!**
  2N is way more reliable but also expensive.

- **Be an actor of energy transition.**
  Optimize your energy bills and valorize your assets by supporting the grid quality

SOLUTIONS

Solutions [1/4]

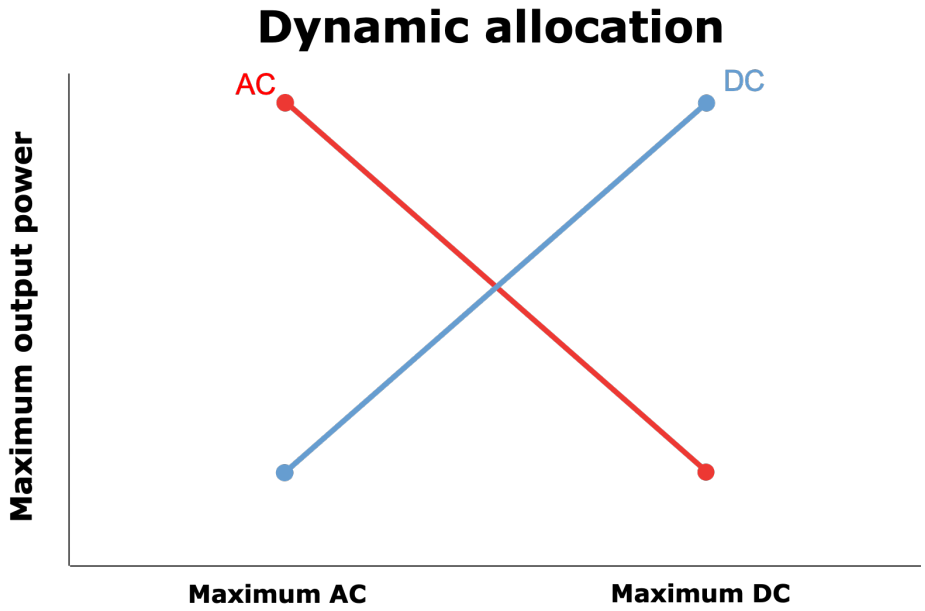
- **Modularity offers Pay as you grow possibility**
  With CE+T, you only install the power you need and expand later.



- **Hot swappability gives easy** and **riskless maintenance**
  Easy replacement procedure:
  - Unplug
  - Take a new one
  - Plug in

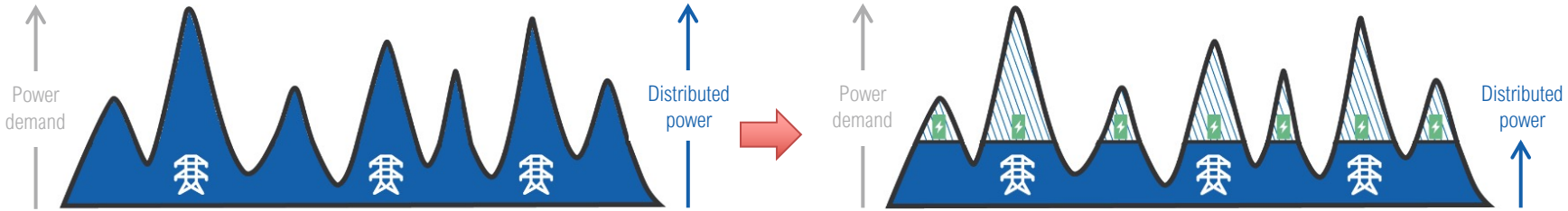
Solutions [2/4]

- **Secure AC & DC Loads, even for unpredictable allocation**
  Total output power dynamically shared between AC & DC.

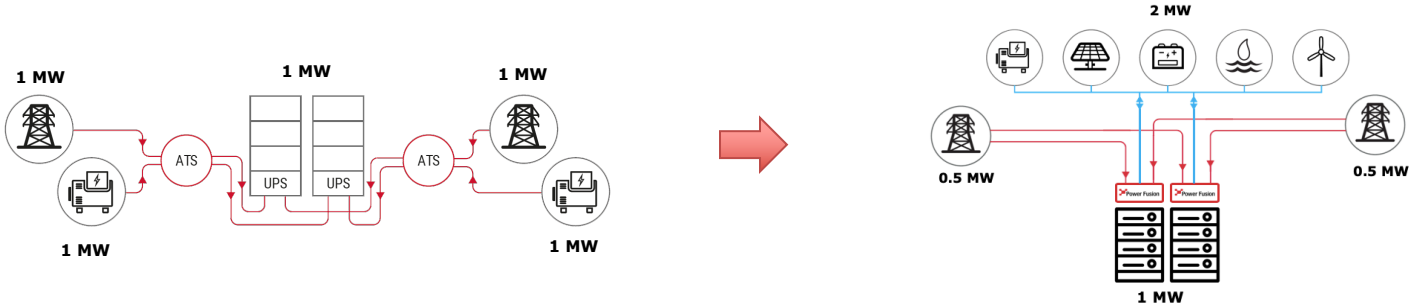


Solutions [3/4]

- **Less distributed power**
  Sizing based on average consumption; Batteries used to absorb peaks



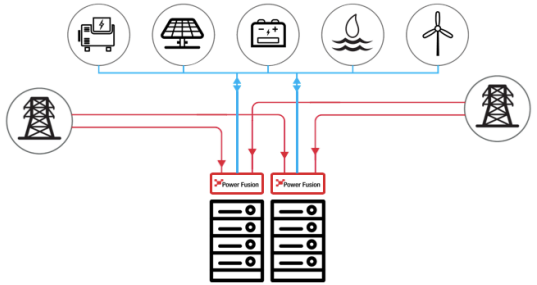
- **Less Stranded power**
  2N related over-sizing reduced; Leading to efficiency increase



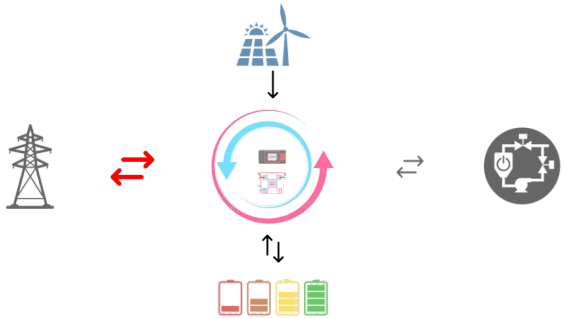
Solutions [4/4]

- **Go Green**
  Reduction of environmental impact with integration of:
  - Renewable sources
  - Energy storage system
  - Energy management capabilities

  ➡ Turn datacenter into microgrid



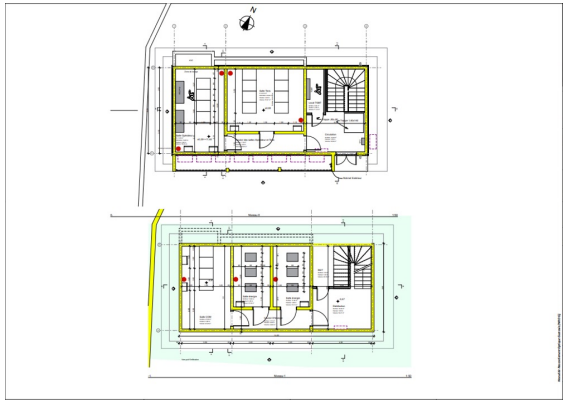
- **Become Grid interactive**
  Bidirectional grid interaction & grid support
  - Participate in network flexibility
  - Create VPP



USE CASE 1:
OPTICAL NODE

Context

- A public network **3 optical nodes**, located in a Caribbean **island**, leasing optical fiber to internet service providers
- For better protection against **cyclonic phenomena**
  - 100% underground (unlike the vast majority of FTTH networks)
  - Sub-distribution cabinets located in **secure technical rooms**

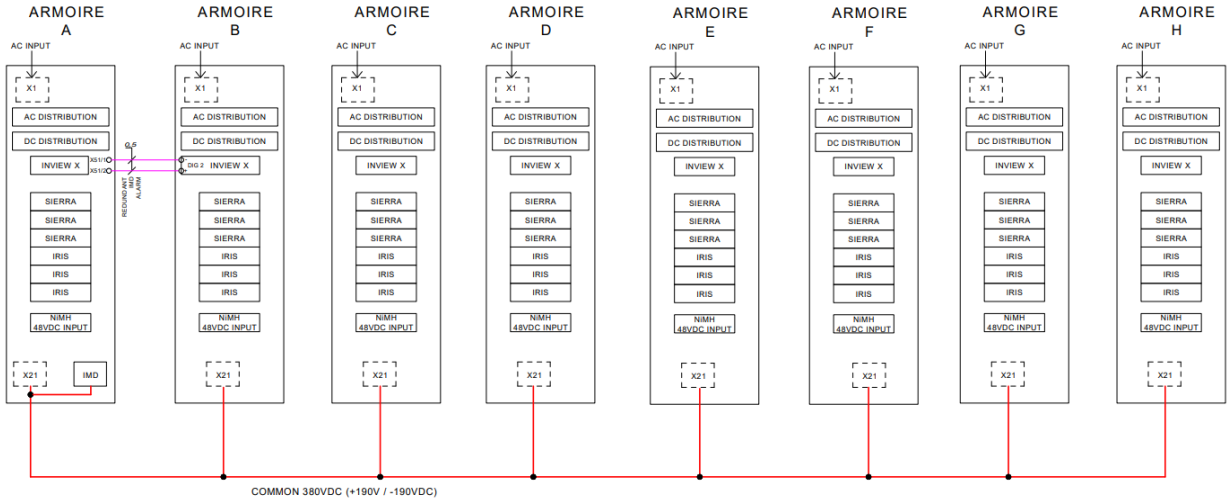


Customer requirements

- Secure **AC & DC** loads
- **Upgradable** (2 phases)
- **Availability** >99%
- Easy **maintenance**
- Low **operating cost**
- **Safe** & long-life expectancy battery technology
- Possibility to add **renewables**

Technical Solution [1/2]

- 8 cabinets in total (A+B)
- **Phase 1:** 62kW AC & 36kW DC
- **Phase 2:** 117kW AC & 68,5 kW DC



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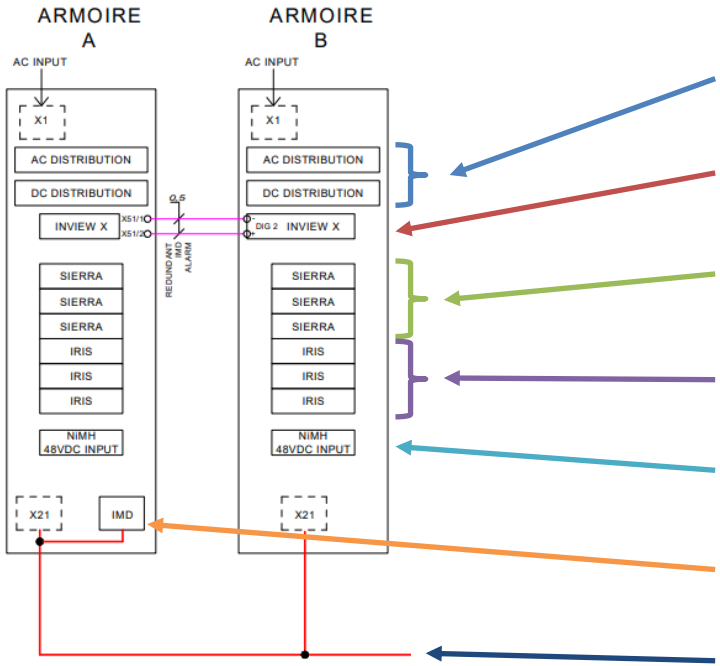
Technical Solution [2/2]

- **Reduced footprint**
- Easy to **install** and **replace** (plug & play)
- **Invest step-by-step** (plug batteries to add power)
- **No BMS** required
- **No maintenance** (sealed battery)
- **Operating Temperature** -30°C to 65°C
- Up to **50C** peaks in **discharge** (300A)
- **Safety aspects: Not flammable, explosive, corrosive or toxic** as composed of aqueous electrolyte
- **No restrictions for transport** by air, road, rail or sea
- **Environment-friendly** and **fully recyclable** as it does not contain heavy metals (RoHS compliant product)
- **Long life operating**: > 8 years (1 back up/month + 1 000 surges/day of 3s @20% of power)

Ni-MH battery

Set-up Review



Customized distributions (AC & DC)

IV X: local control, including battery mgt

Sierra 25: secure AC & DC loads + battery

Iris: link with DC bus

IV X: local control, including battery mgt

IMD: Safety

380Vdc bus: cabinet parallelisation

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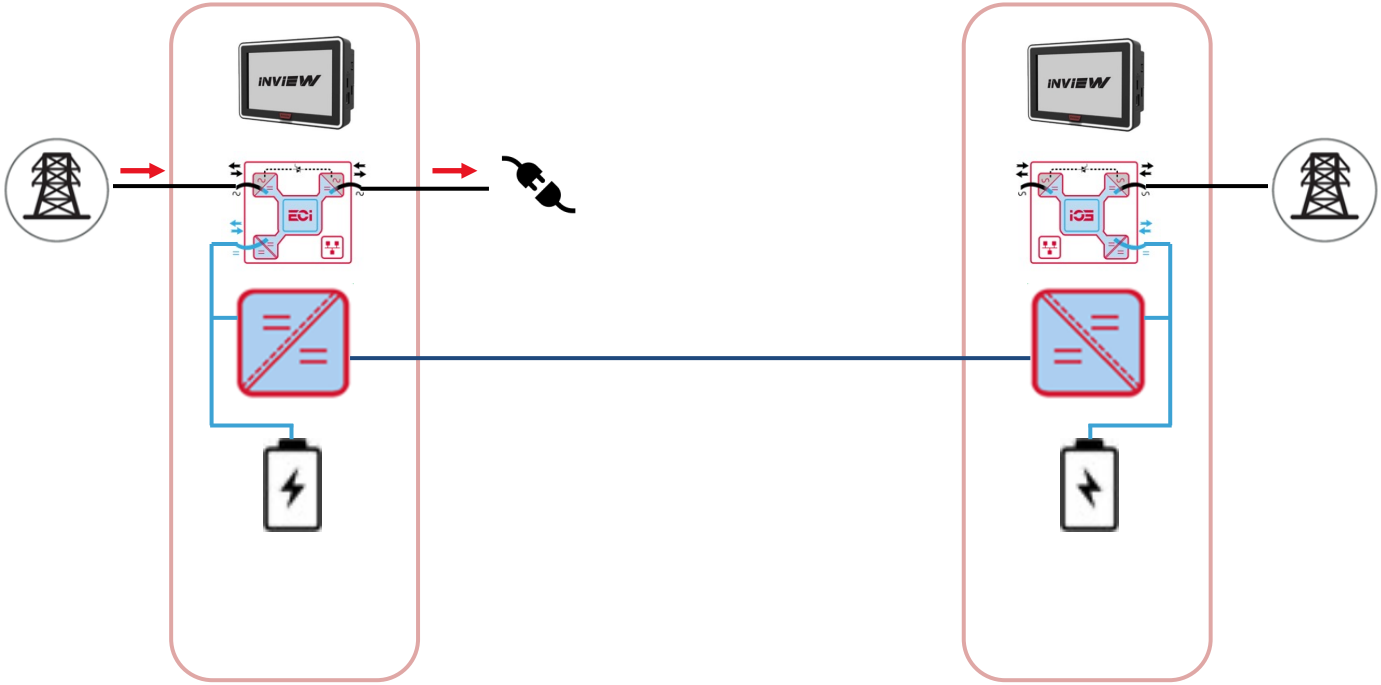
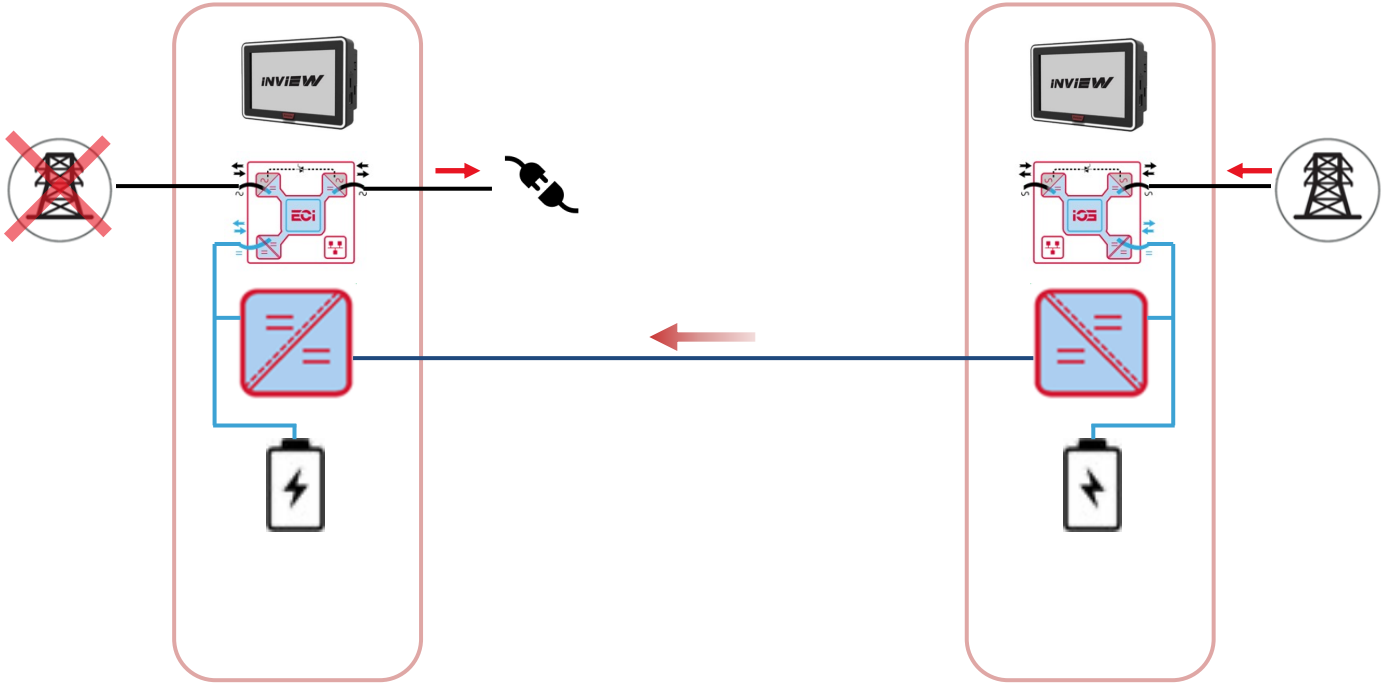
Demo – step 1

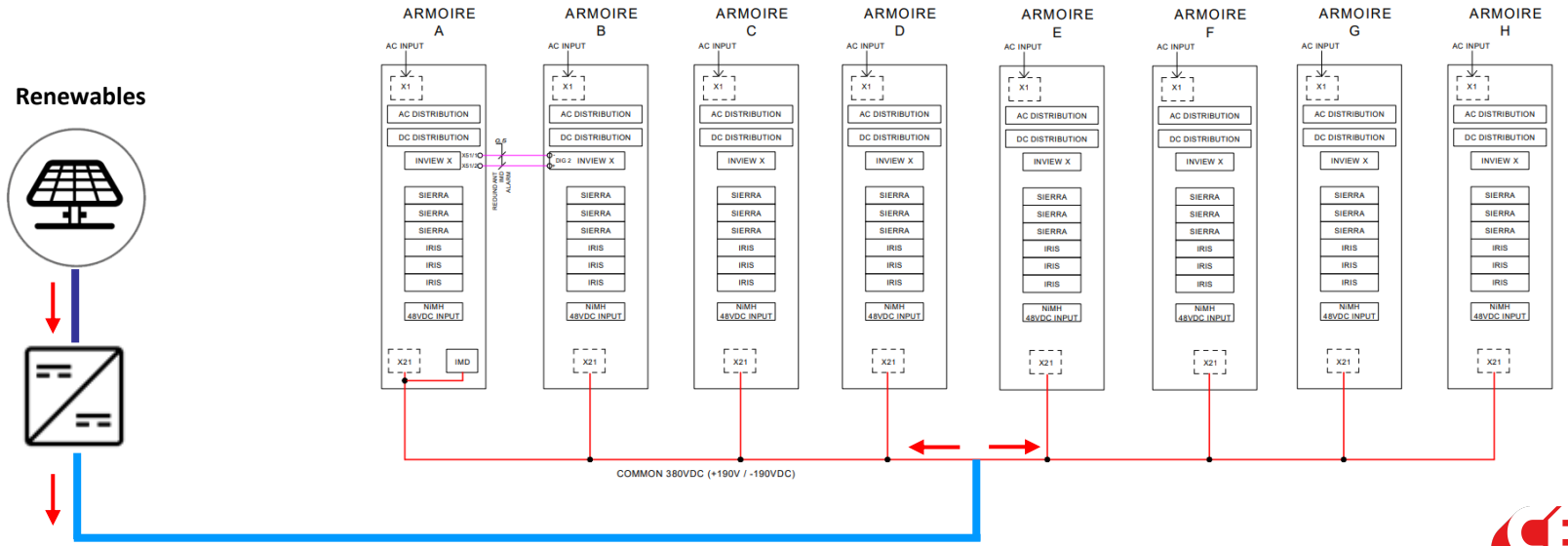


Demo – step 2



Renewable integration

- Possibility to add DC coupled **renewables**
- Automatically 'shared' **over DC bus**
- Act as DC **microgrid**



Why choosing us ?

- **High-end** solution
- Flexibility of the **modular** solution (easy upgrade, secure AC & DC loads)
- Availability: **reliable** solution
- Easy and low **maintenance**
- Ni-MH battery: **reliable**, low maintenance and **safe** technology
- DC coupling **renewables** option

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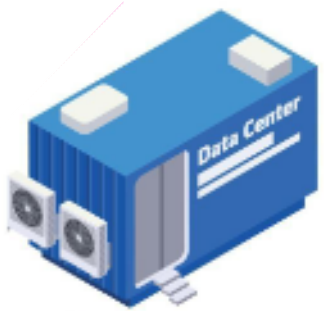
USE CASE 2:
EDGE DATACENTER

Context

- **Innovative solution** development
- **Modular** building solution for **fast deployment** of Datacenter or Edge Networking
- Solution specificities:
  - **Combined AC & DC** distribution
  - Different voltage, especially **400Vdc**
  - Integrated **Renewable** energy sources
  - **New battery** technology compatibility
  - **Grid interactive** capabilities

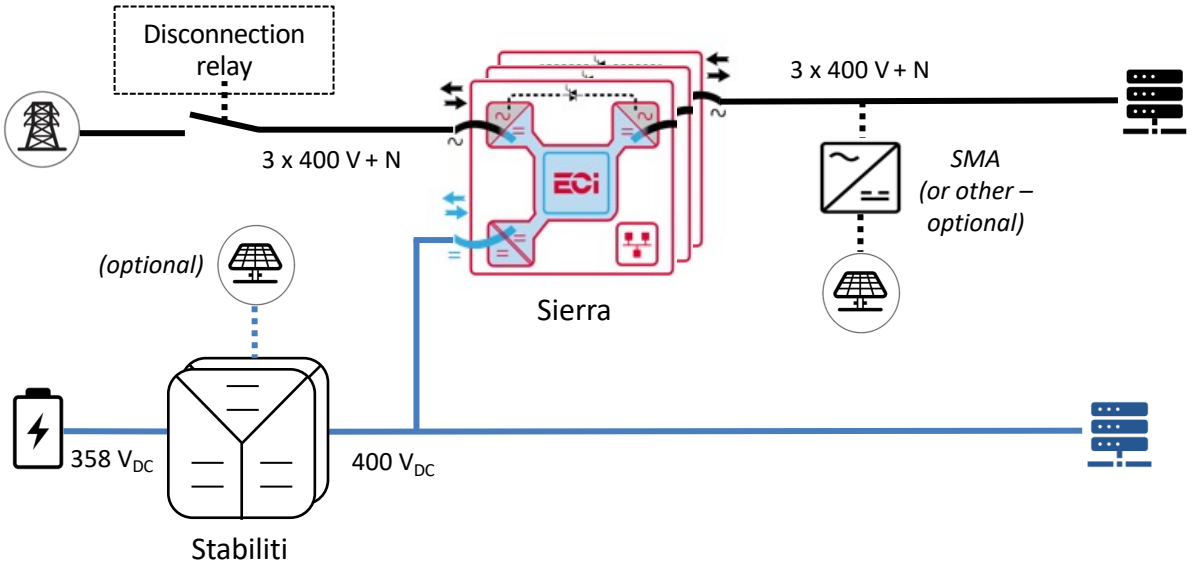


Customer requirements

- **A+B** type solution
- **Modularity**
- Power Range from **30 to 50kW**
- **AC & DC** Loads
- **400Vdc** distribution
- **Renewable** integration
- **Li-Ion** battery compatibility
- **Grid** support and **interactivity**
- **Outdoor** solution

Technical Solution

- 35kW AC & DC (combined)



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Why choosing us ?

- Long lasting **relationship** with the customer
- CE+T known as **innovative** company in Telecom market
- **Performance** of CE+T modules proved over **30+ years**
- **380Vdc** available **solution** & **expertise**
- Solution based on **only 2 components**
- Part of the solution can be installed **outdoor**
  - Reduced footprint
  - Freed wall space
- **Flexibility**, **adaptability**, **agility**

USE CASE 3:
EDGE CABLE LANDING STATION

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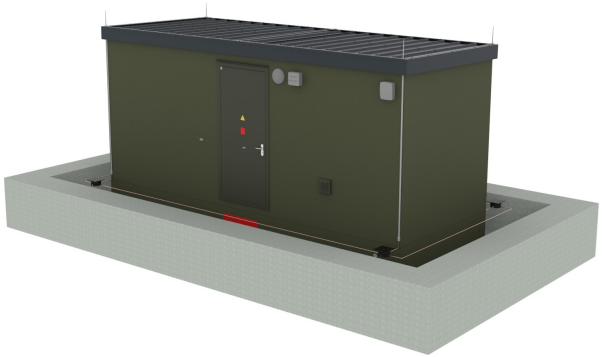
Context

- 500 MW **Offshore Wind farm**
- Edge Cable Landing Station **shelter** (by Grolleau SA FR)
- **Remote** location
- Surface < 20 m²
- Mixed-use **AC & DC** Loads



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Building sustainable solutions

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Customer requirements

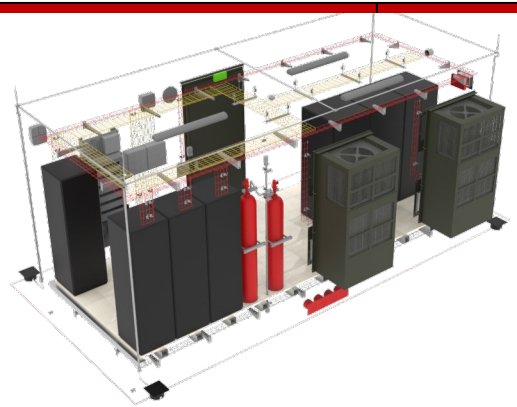
- **Telecom** & **server** application
- **Redundancy** N+1
- **Reliability** up to 98%
- Low **operating costs**
- **SLA** within 6 hours




Technical Solution

- Sierra 25 48Vdc 230Vac
- Inview S (SNMP v1, v2, v3 & ModBus RTU)

Description	SIERRA UPS AC+DC 4 modules installed
Load Capacity	4,2kVA AC out + 2kW DC out + battery recharge 3,4kW
AC input	3x400VAC+N
AC Output	230VAC 10 breaker 16A 30mA diff
DC battery	5 string XP12V5300FT total 20 bloc for 6H backup Each battery string is protected with breaker in negative
DC output	10 DC breaker 16A 1 pole in negative
Qty Cabinets	2
Foot Print per cabinet	600 x 600 mm
Cabinet Height	2100 mm



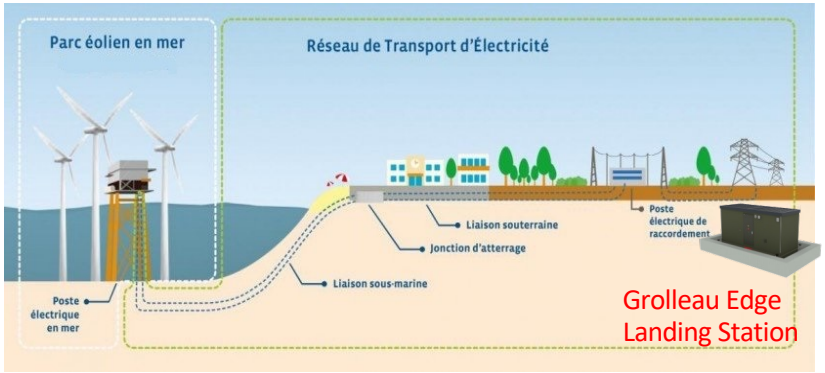
Why Choosing us ?

Grolleau R&D department vision:

"With CE+T Power, we choose a **modular** solution for our containerized product, **limited** available **space** and conform to the **Harsh and complexity** of Grolleau's customer **application** (coast, windmills farm, reliability requirements)."

Another main aspect is the **mixed-use of AC & DC** load (with different rate at the beginning of the project and during infrastructure's evolution), the Sierra technology permits to supply with AC & DC with dynamic allocation of power. Grolleau and his customer can increase available power by adding **hot pluggable** Sierra module.

This choice of CE+T solution is confirmed in the integration. Grolleau and his Customer can monitor the power allocation and perform an easy maintenance thanks to **Inview** monitoring solution, in **local** or **remote access**.



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About GROLLEAU

- **Founded in 1950**, Grolleau is a French industrial player specialized in the supply of infrastructure equipment to support the development of **smart cities** and territories in full swing with the deployment of **5G and connected objects.**
- Grolleau is the recognized specialist in **outdoor equipment** for the protection and securisation of critical technologies that ensure the proper functioning of territories (energy and water management, connectivity and telecommunications, green mobility, smart grid). Grolleau is the **French number 1 in urban cabinets** (telecoms / energy) throughout the territory and the **1st French manufacturer on-street electric charging stations**.
- French constructor, designer, manufacturer and integrator of its equipment, Grolleau controls the entire value chain, **from design to delivery**, on its industrial site in Montilliers (Angers - France) over more than 60,000 m2 and employs 200 people. The company generated revenue of €31.3 million as of March 31, 2022 and intends to more than double its revenue between 2021-2022 and 2025-26.

CONCLUSION

Flexible and smart solutions for edge computing

- Sector facing numerous Challenges
- CE+T Solutions proposal
  - Module level
    - Modularity
    - Hot swappability
    - AC & DC dynamic allocation
  - System level
    - DC distribution
    - Integrated solution (battery, converter, IoT, … under unique Inview control & monitoring)
    - Energy management (peak shaving, renewables, self-consumption, …)

CE+T solutions ready to support you in the fast-moving energy transition challenges

QUESTIONS & ANSWERS

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for your attention

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