GT place du réseau DC dans le bâtiment
Etude technique

-

26 mars 2019

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L'institut pour la transition énergétique de la ville

Quel potentiel aujourd'hui?

Le DC dans le bâtiment: quel potentiel aujourd'hui?

3 Axes de développement

pour le réseau DC dans le bâtiment

Technologies existantes

Réalisations

Travaux de recherche

efficacity

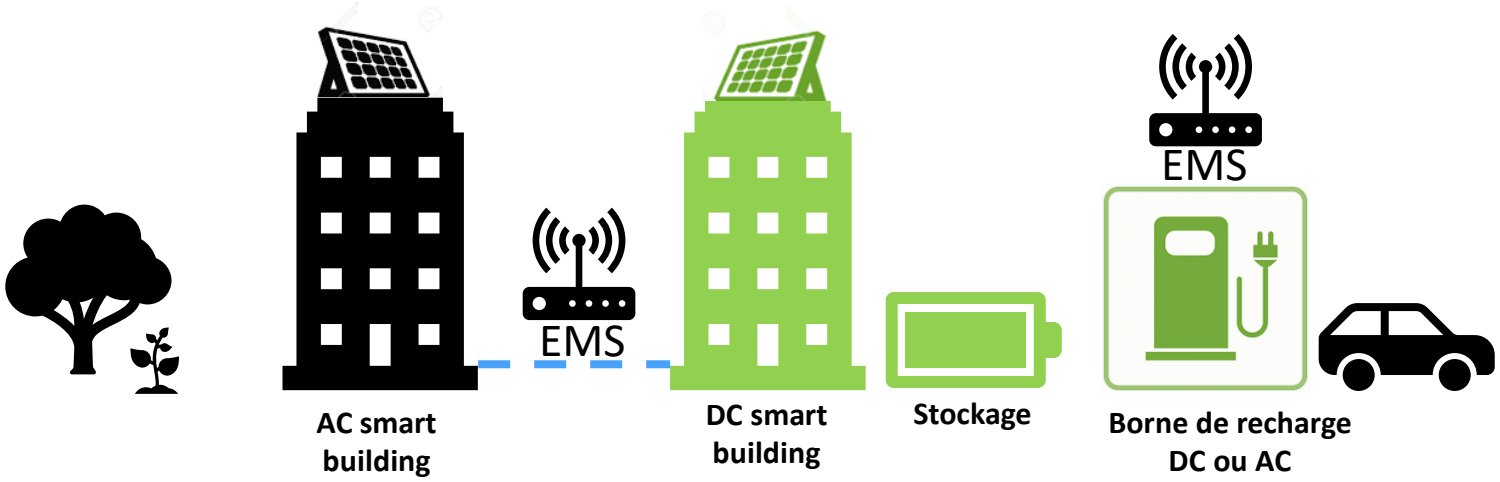
Technologies existantes

Les équipementiers pour le Courant Continu

Autoconsommation

Stabilité

Efficacité



Disponibilité

sécurité

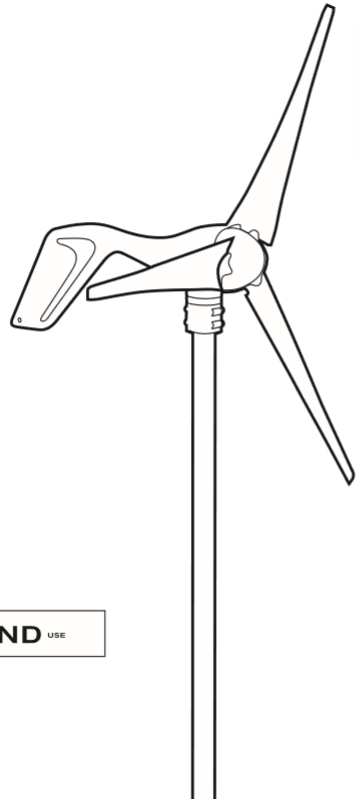
interopérabilité

→ Totalement DC ou **mixte AC et DC ?**

Les architectures possibles

Tension de 12 à 48V- faibles puissances

Exemple: éolienne pour réseau domestique



FOR LAND USE

aiR 40

OWNER'S MANUAL

Installation • Operation • Maintenance

Southwest Windpower, Inc.
1801 West Route 66
Flagstaff, Arizona 86001
Toll Free Phone: 866.805.9463
Phone: 928.779.9463
Fax: 928.779.1485

www.windenergy.com

MADE IN THE USA

Les architectures possibles

Tension de 12 à 48V- faibles puissances

5-1 Hybrid System Wiring

Fig. 11 represents a typical "hybrid" system with solar panels. Some charging sources (solar panels, fuel-powered generators, additional wind generators, etc.) connected to the same system may cause interference with the AIR wind turbine internal electronics and result in pre-regulation. The interference will not harm the turbine; it will just cause it to spin slowly as if "braked" or it may stop the turbine. If this occurs, test for possible interference by disconnecting the other charging sources to determine the possible cause. If possible wire the turbine and PV panels to their own set of battery posts.

TIP: In this figure the AIR wind turbine internal regulator is used. A diversion type external regulator could also have been used.

TIP: Voltage "pre-regulation" may be prevented by increasing the regulation set point. See section 7-3-2.

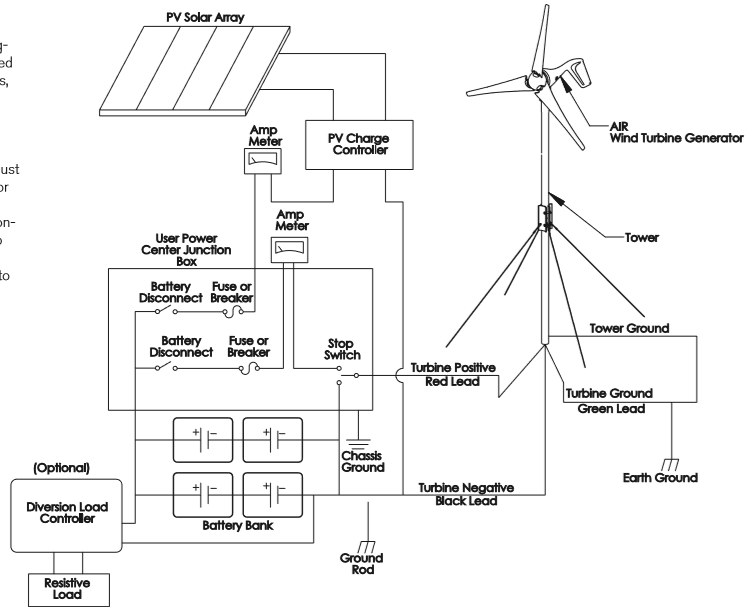


Fig. 11. Hybrid System with Solar Panels

AIR 40 Owner's Manual **15**

→ Développement des régulateurs de charges pour l'autoconsommation

Quid du processus de contrôle? Figé? Modifiable? Peut-il fonctionner sans batterie?

Les architectures possibles

Tension de 12 à 48V- *idéal pour les faibles puissances*

	Potentiel	Contraintes
Réseau POE	Mixe donnée et énergie	Puissance max: 100W
Réseau électrique	Intégration petits ENR	Puissance max: 10kW Fort ampérage

Disjoncteur DC en BT jusqu'à 500V- 50A

→ Fort ampérage = **problématique de sécurité des personnes**

Les architectures possibles

Tension de 120V à 380V- *idéal pour les fortes puissances*

	Potentiel	Contraintes
Réseau électrique	Nœud DC avant conversion en AC	Puissance max: 10kW Ampérage réduit

Disjoncteur DC en BT jusqu'à 500V- 50A

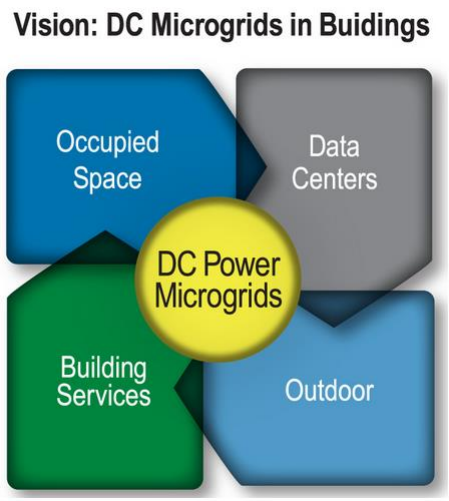
→ Réduction de l'ampérage = **réduction des sections de câbles**

Quid du disjoncteur différentiel en DC?

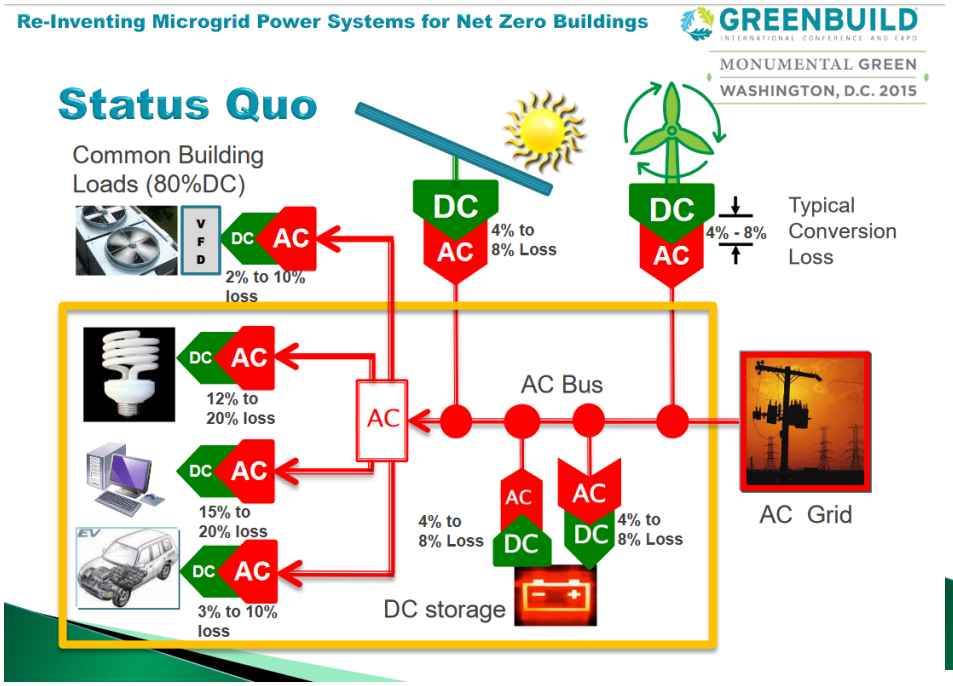
Emergence de standards au Etats Unis

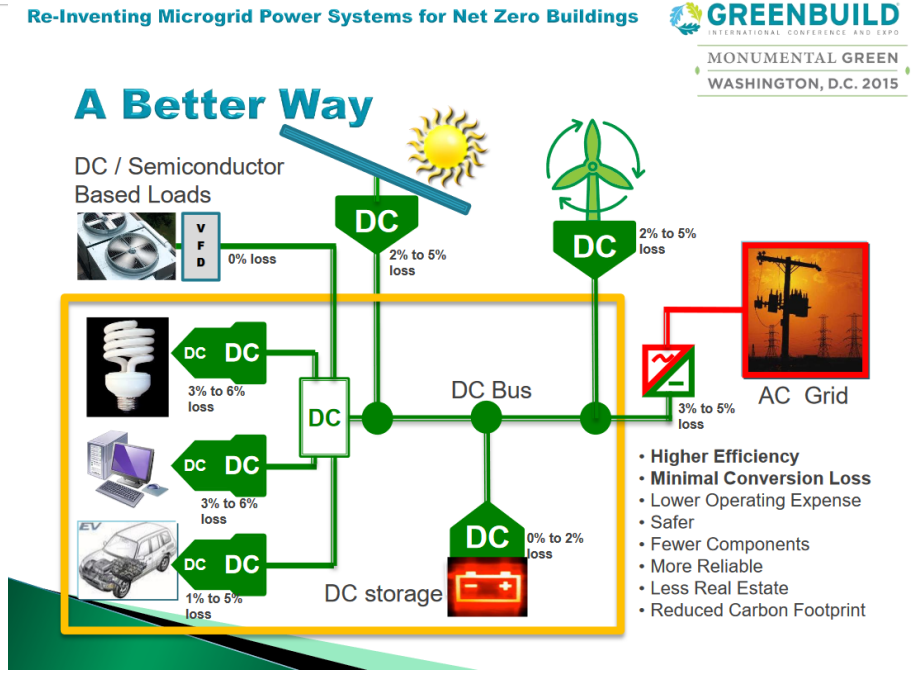
Mission

An open industry association developing standards leading to the rapid adoption of DC power distribution in commercial buildings.



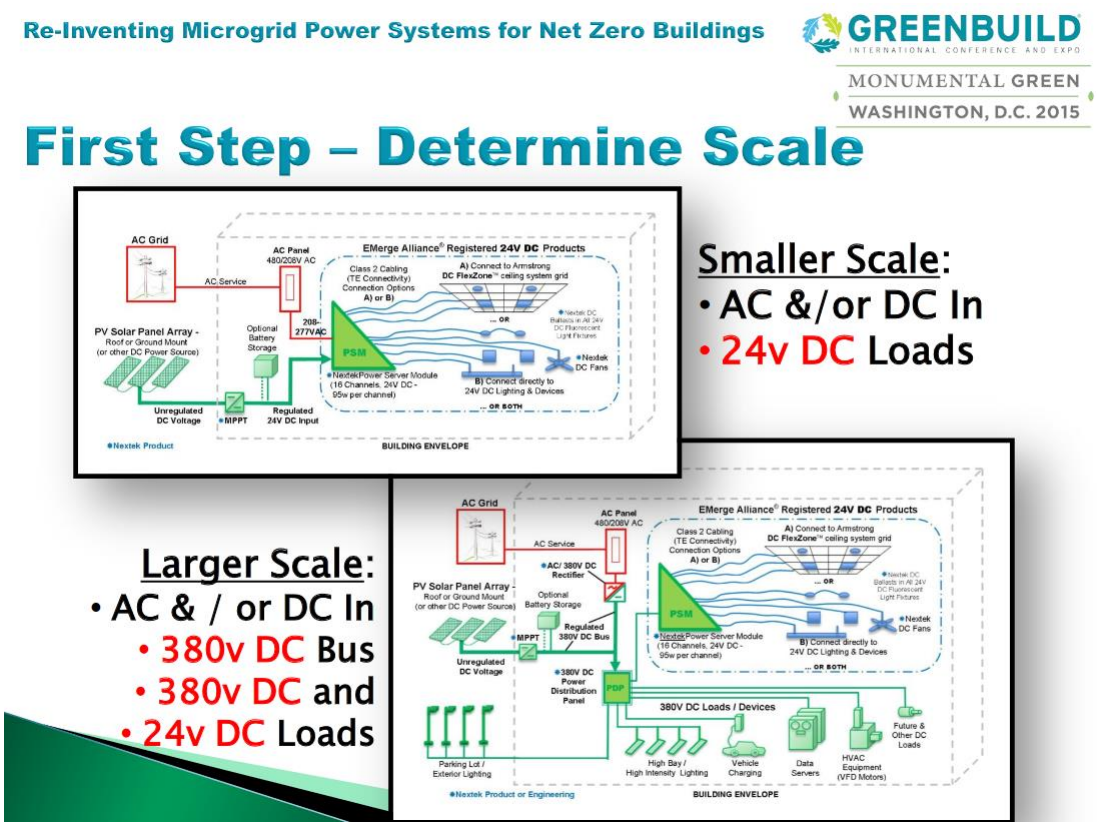
Emergence de standards au Etats Unis





Sources: https://www.emergealliance.org/portals/0/documents/events/greenbuild2015/151104_Greenbuild_2015_Final.pdf

Emergence de standards au Etats Unis



Sources: https://www.emergealliance.org/portals/0/documents/events/greenbuild2015/151104_Greenbuild_2015_Final.pdf

« IEEE and EMerge Alliance Sign Memorandum of Understanding (MoU) to Allow Collaboration in Hybrid AC/DC Microgrid Power Standardization » - décembre 2015

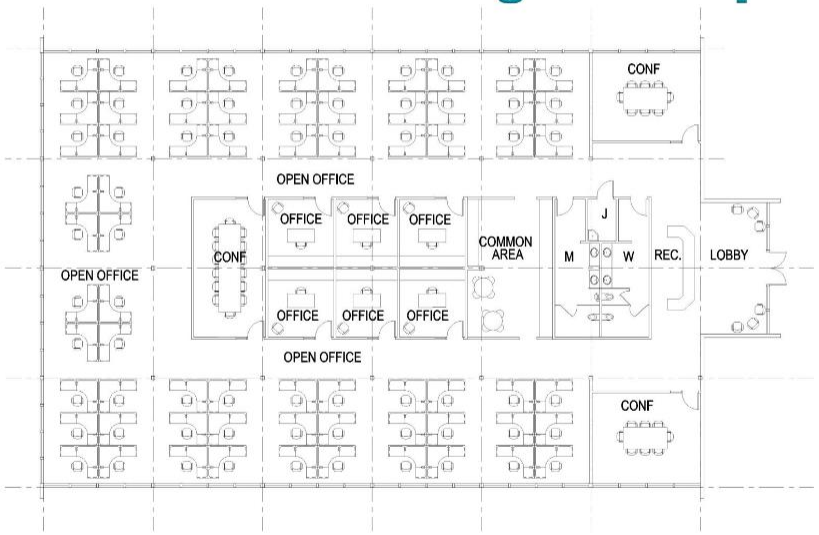
Réalisations

Eclairage DC

Re-Inventing Microgrid Power Systems for Net Zero Buildings

GREENBUILD INTERNATIONAL CONFERENCE AND EXPO
MONUMENTAL GREEN
WASHINGTON, D.C. 2015

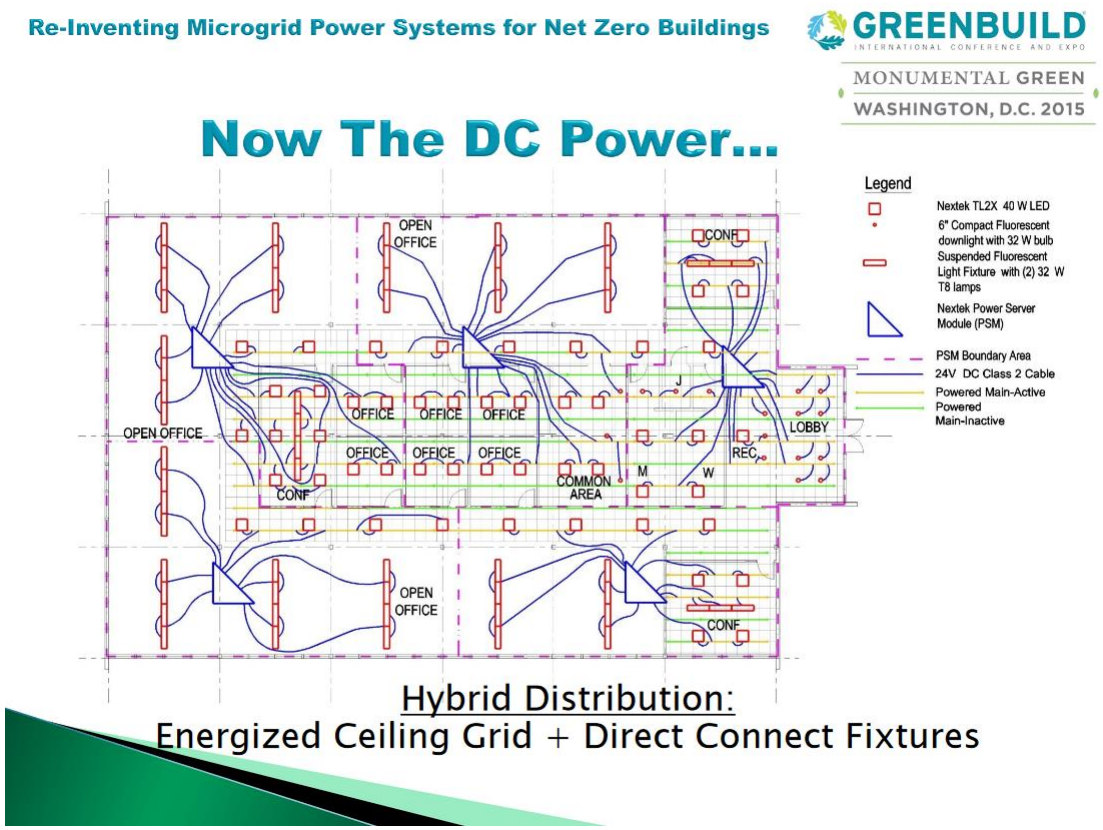
How About A Design Example?



A 10,000 sf Office Setting…

Sources: https://www.emergealliance.org/portals/0/documents/events/greenbuild2015/151104_Greenbuild_2015_Final.pdf

Eclairage DC



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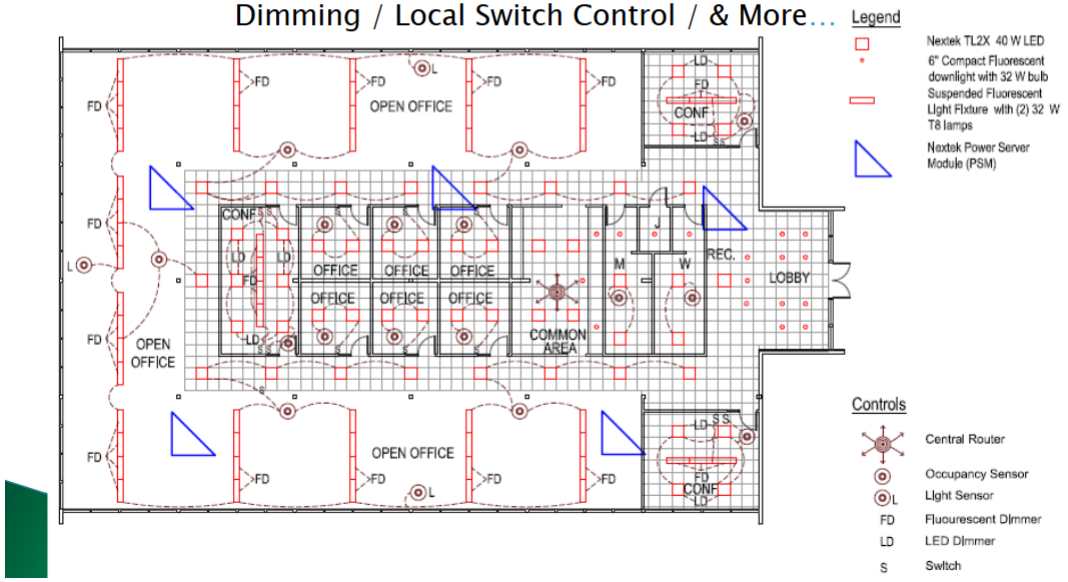
Eclairage DC

Re-Inventing Microgrid Power Systems for Net Zero Buildings

GREENBUILD INTERNATIONAL CONFERENCE AND EXPO
MONUMENTAL GREEN
WASHINGTON, D.C. 2015

Full Featured Control Solution…

All The Bells & Whistles… Occupancy Sensors / Photo Sensors / Dimming / Local Switch Control / & More…



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Eclairage DC

Re-Inventing Microgrid Power Systems for Net Zero Buildings

GREENBUILD INTERNATIONAL CONFERENCE AND EXPO
MONUMENTAL GREEN
WASHINGTON, D.C. 2015

Bedrock (Quicken Loans – Detroit, MI

- **3 Floors of Class A Office Space**
- **14th Floor:** T8 Fluorescent – No Controls
- **15th Floor:** LED Retro Tube – No controls
- **16th Floor:** LED Retro Tube – W SKY controls
- **Dramatic Energy Savings 75%!**
- **Recognized by Americas Green Challenge** (White House Initiative)

Sources: https://www.emergealliance.org/portals/0/documents/events/greenbuild2015/151104_Greenbuild_2015_Final.pdf

Data center

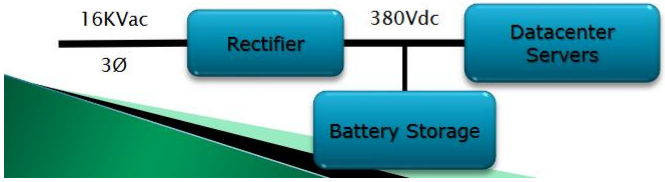
Re-Inventing Microgrid Power Systems for Net Zero Buildings

GREENBUILD INTERNATIONAL CONFERENCE AND EXPO
MONUMENTAL GREEN
WASHINGTON, D.C. 2015

Full Scale Data Center Installation

Green.ch-ABB Zurich-West 380Vdc Data Center

- ABB/Validus Power Distribution
  - In: 16KV AC
  - Out: 1MW @ 380Vdc
  - Battery Backup: 10 mins
  - Backup Generation
- 1,100m^2 of 3,300m^2 Vdc
- HP 2U, Blades & Storage Servers
- Demonstrated Benefits
  - 10% Better Energy Efficiency
  - 15% Lower Capital Cost
  - 25% Smaller Footprint
  - 20% Lower Installation Costs



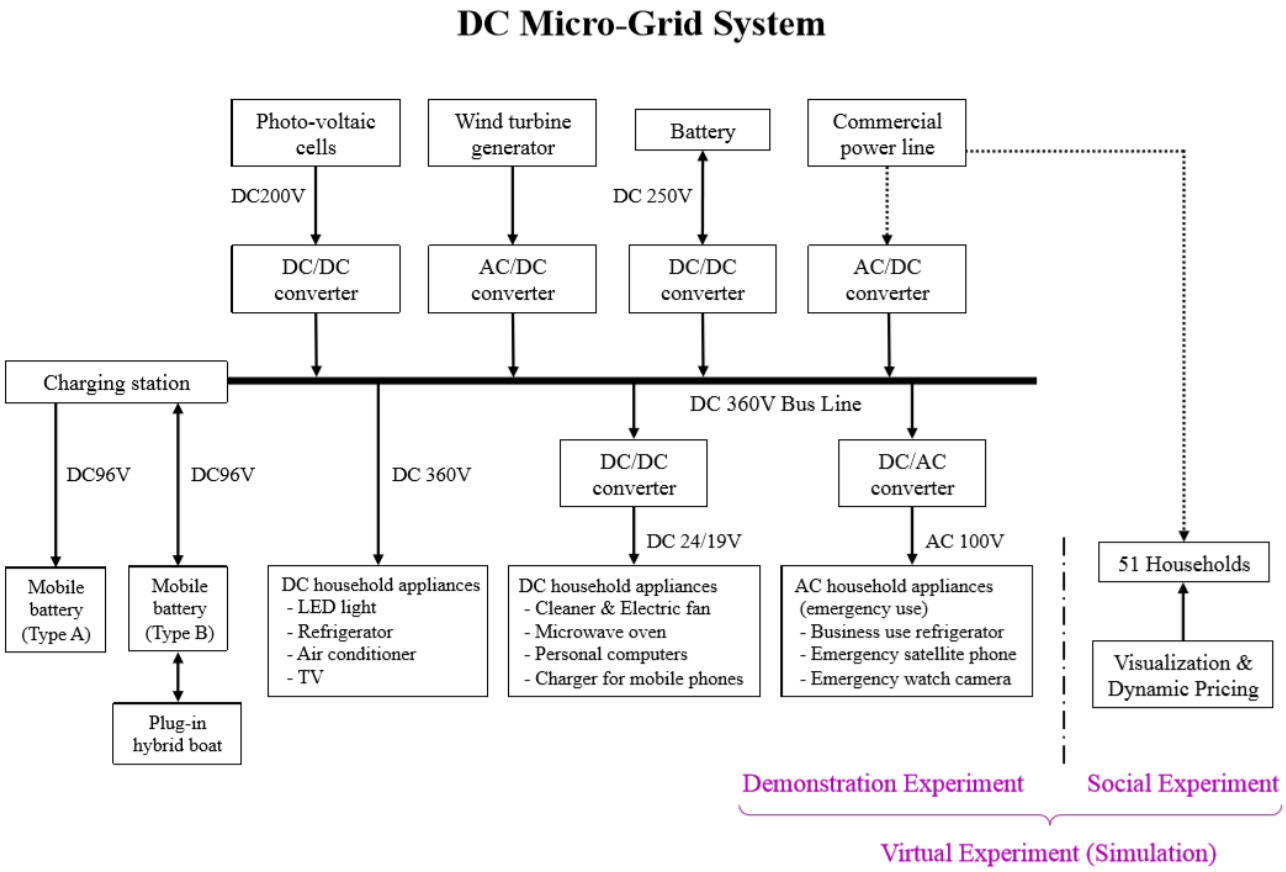
Photos courtesy of ABB* and HP*

Sources: https://www.emergealliance.org/portals/0/documents/events/greenbuild2015/151104_Greenbuild_2015_Final.pdf

Nushima Project - Kobe University- 2012-2014

Source: « Nushima Project An Experimental Study on a Self-Sustainable Decentralized Energy System for an Isolated Island», Hisashi Tamaki, Kobe University

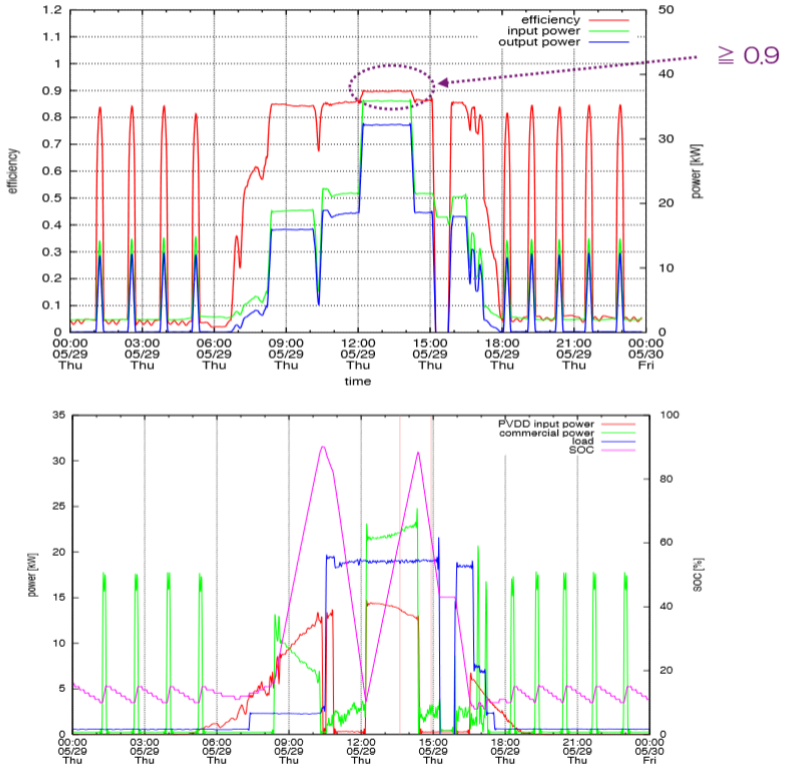
Nushima Project - Kobe University- 2012-2014



Source: « Nushima Project An Experimental Study on a Self-Sustainable Decentralized Energy System for an Isolated Island», Hisashi Tamaki, Kobe University

Nushima Project - Kobe University- 2012-2014

Demonstration Experiment — Efficiency of Power Conversion (May 29)

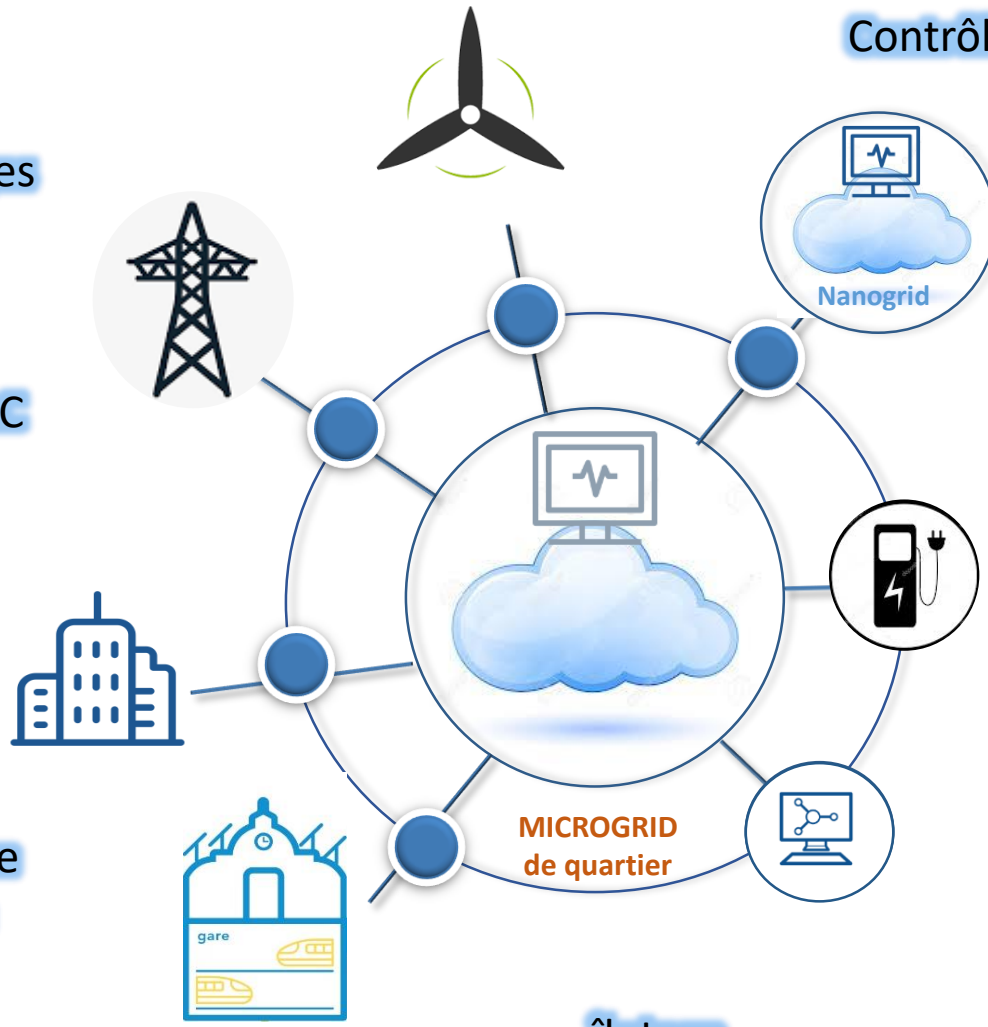


Source: « Nushima Project An Experimental Study on a Self-Sustainable Decentralized Energy System for an Isolated Island», Hisashi Tamaki, Kobe University

Travaux de recherche

Pour aller plus loin…

Les thématiques étudiées par la recherche



Intermittence sources et charges

Contrôle optimal

Service système

Architecture DC vs AC

Technologies batterie Elec de Puissance

Multi-échelles

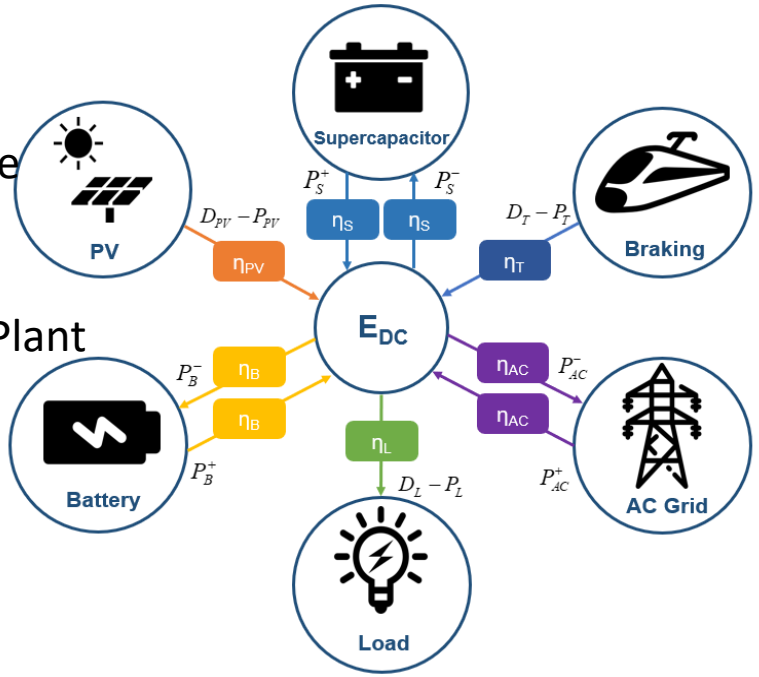
Maintenance prédictive

sécurité

îlotage

Microgrid DC Ilôtée ou connectée au réseau AC

- **MicroGrid DC**
  - Intégration de la production distribuée, des VE et du stockage
- **Commande distribuée du MicroGrid DC**
  - MicroGrid DC – hiérarchique avec communications limitées
- **Support du réseau AC - Services système**
  - Stabilisation du plan de tension
  - Réponse en fréquence
  - Inertie synthétique – Fast Frequency Response
- **Sous-station intelligente**
  - pilotage du flux de puissance, Virtual Power Plant



efficacity

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