

# Caterpillar Hybrid Microgrids

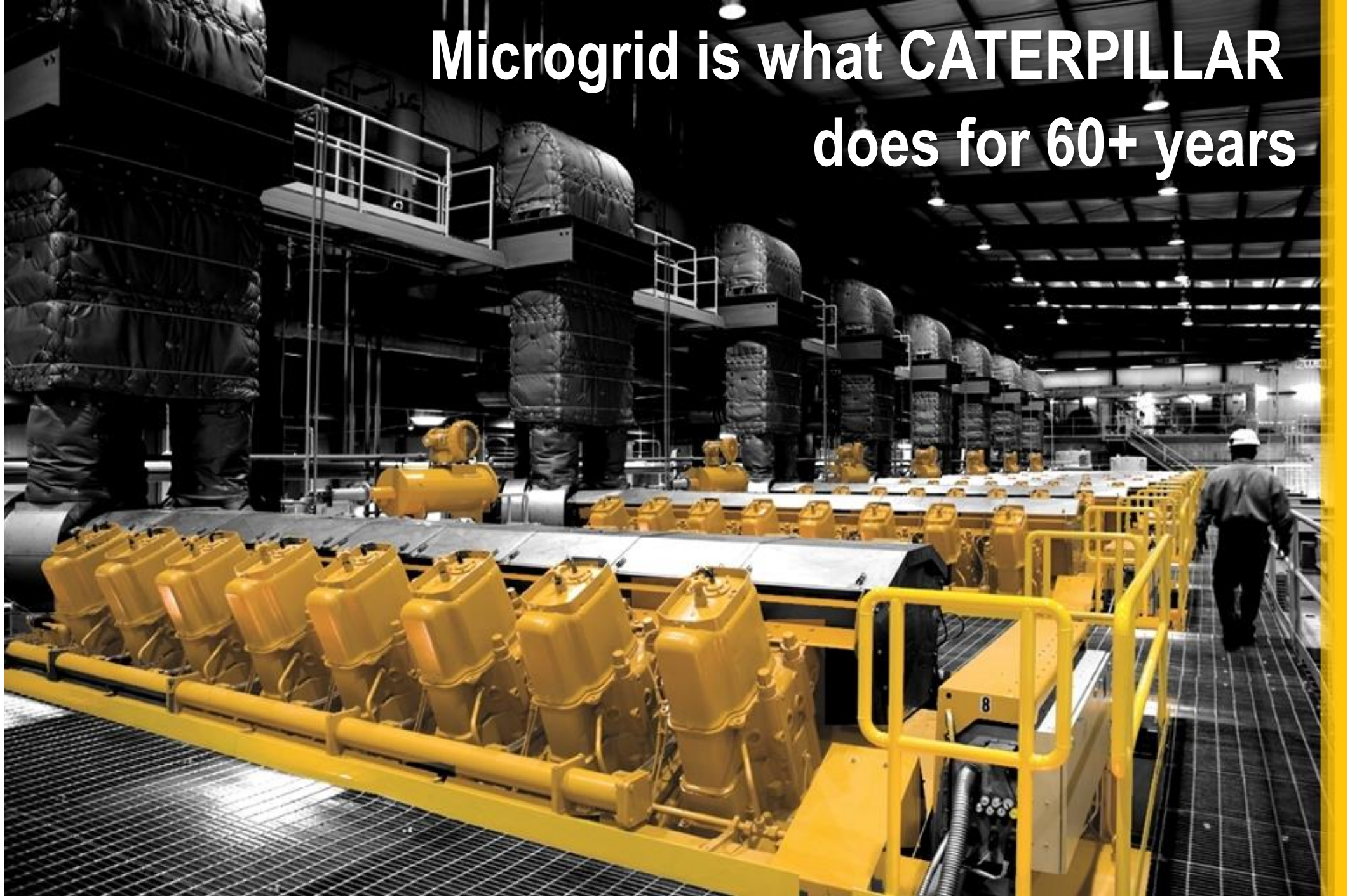
Melih Pazar  
Territory Manager, AME

François-Xavier Saury  
Microgrid Development Manager  
March 2016





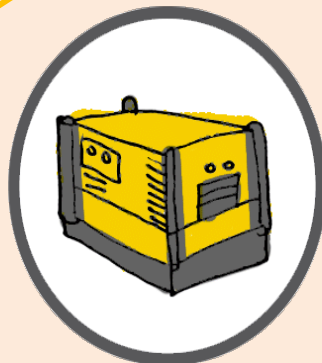
**Microgrid is what CATERPILLAR  
does for 60+ years**



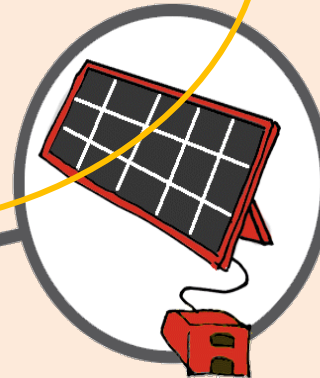
**CAT**  
Remote  
monitoring



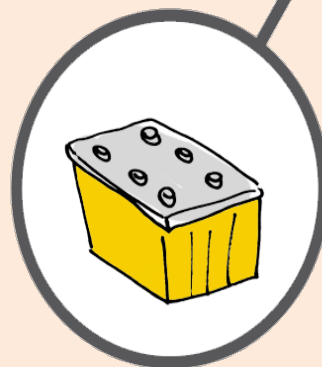
**CAT**  
Genset



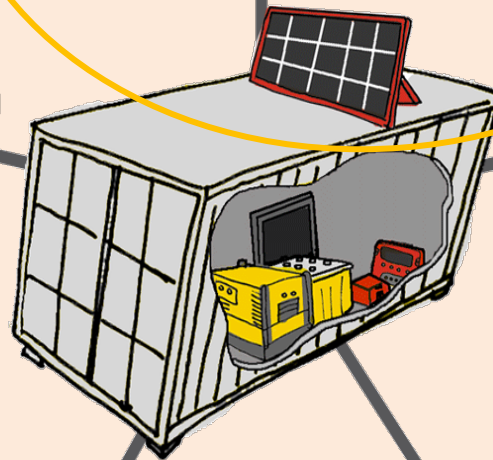
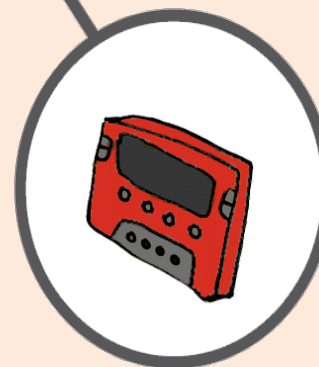
**CAT**  
Solar panels  
and racking



**CAT**  
Energy  
storage



Controls  
**CAT**  
(Microgrid Controller)

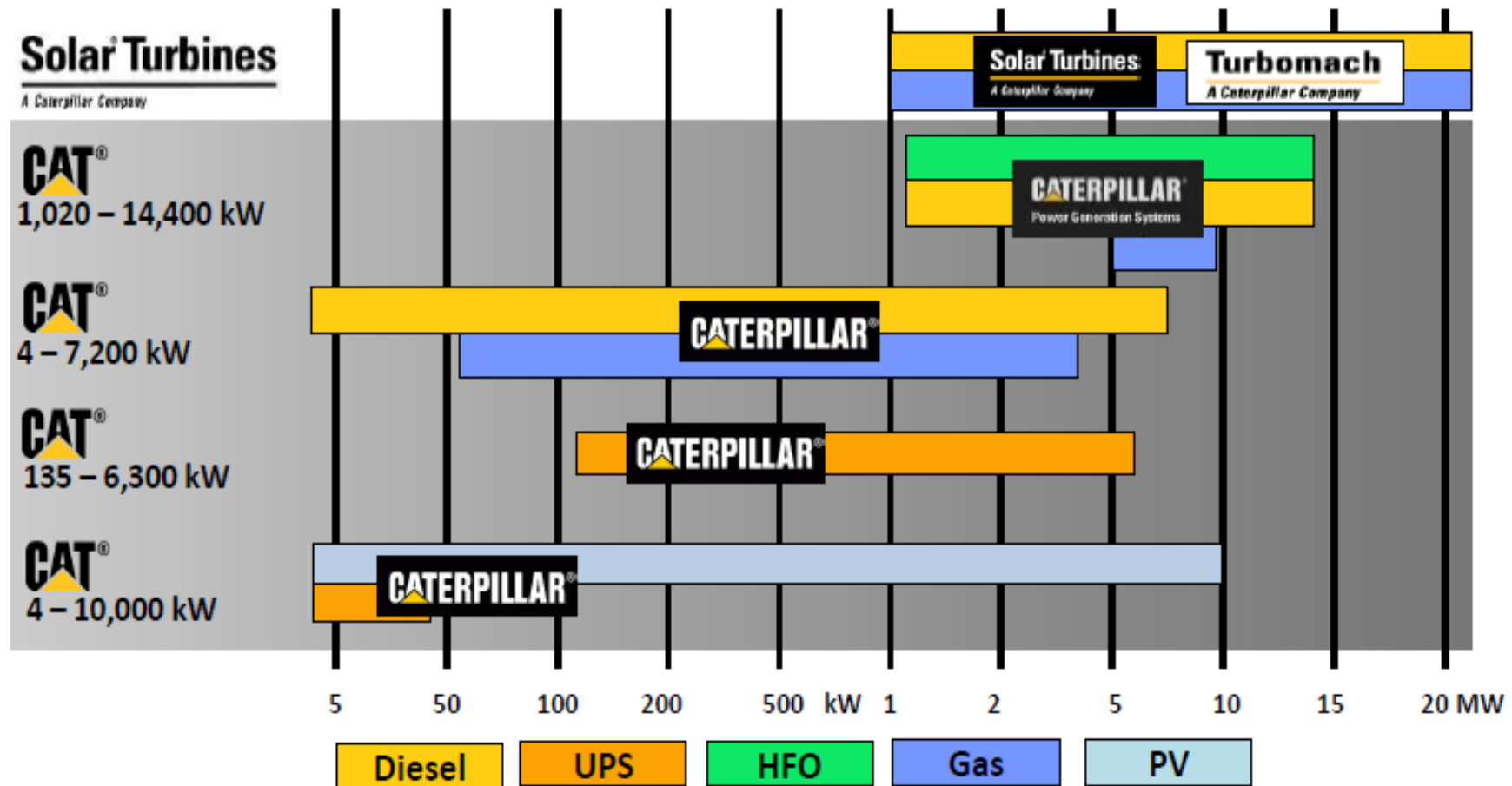


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# Power Generation Product Portfolio

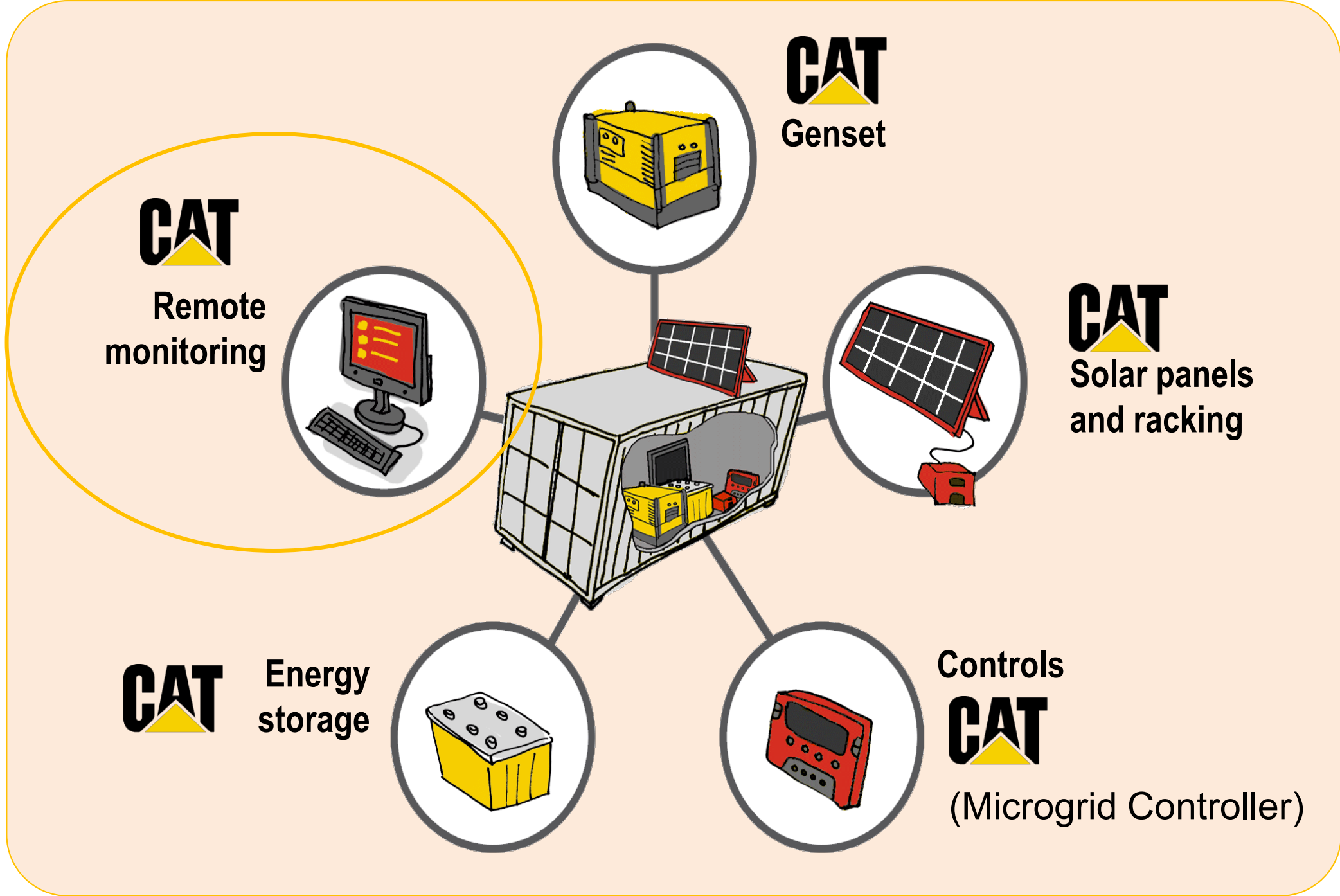
## Caterpillar Electric Power Products 4 kW to 22 MW



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# CAT<sup>®</sup> CONNECT



**EQUIPMENT  
MANAGEMENT**



**PRODUCTIVITY**

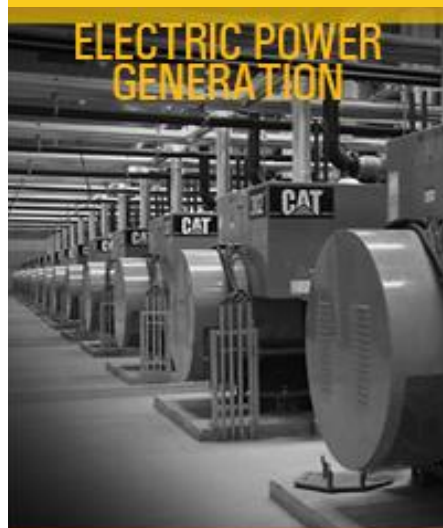


**SAFETY**

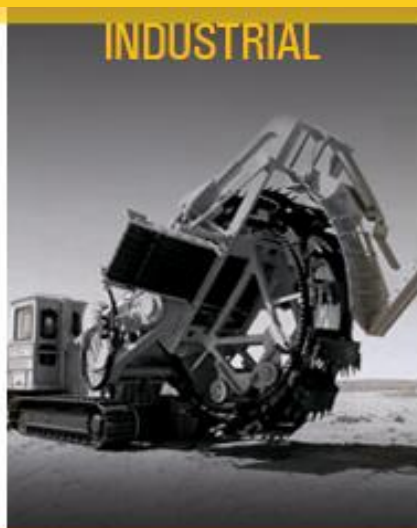


**SUSTAINABILITY**

**A suite of integrated technology and Cat dealer service offerings for managing your assets and operation. Cat Connect gives you the power to stay ahead of the competition and make more money with Caterpillar.**



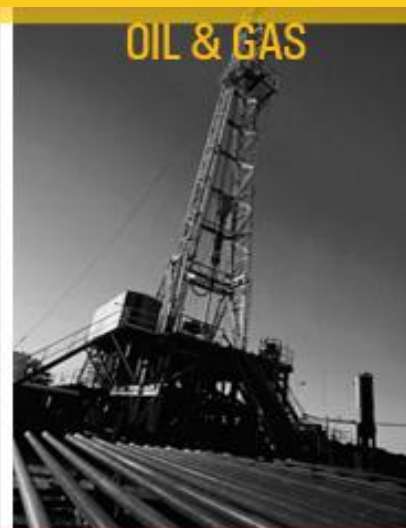
**ELECTRIC POWER  
GENERATION**



**INDUSTRIAL**



**MARINE**



**OIL & GAS**

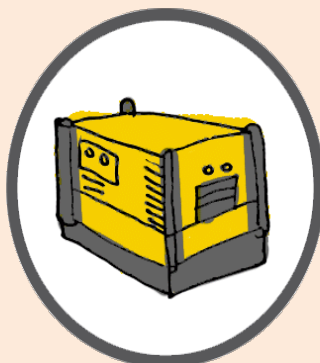


**RAIL**

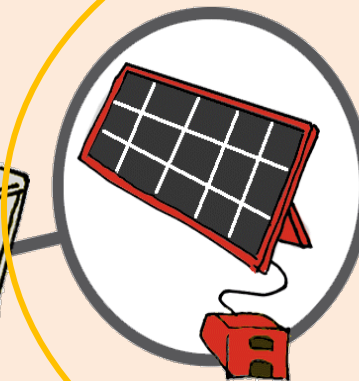
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Remote  
monitoring



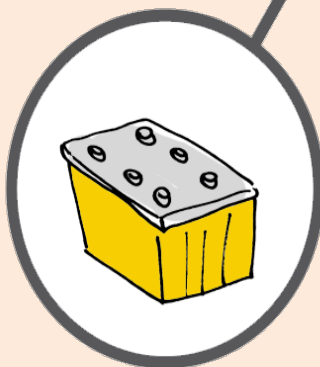
**CAT**  
Genset



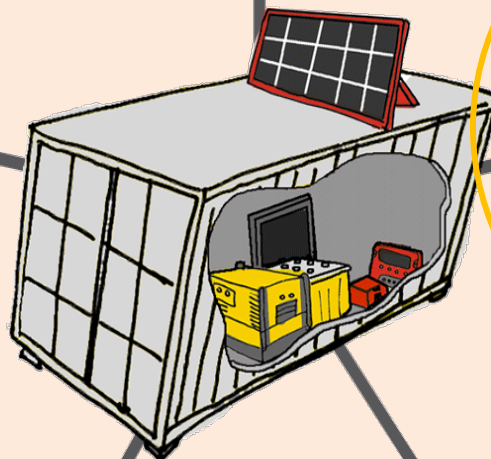
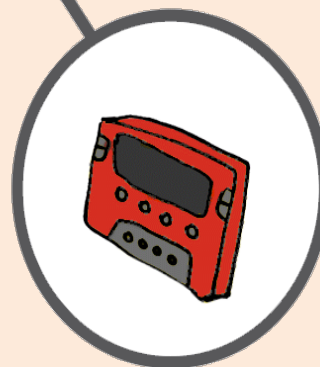
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Solar panels  
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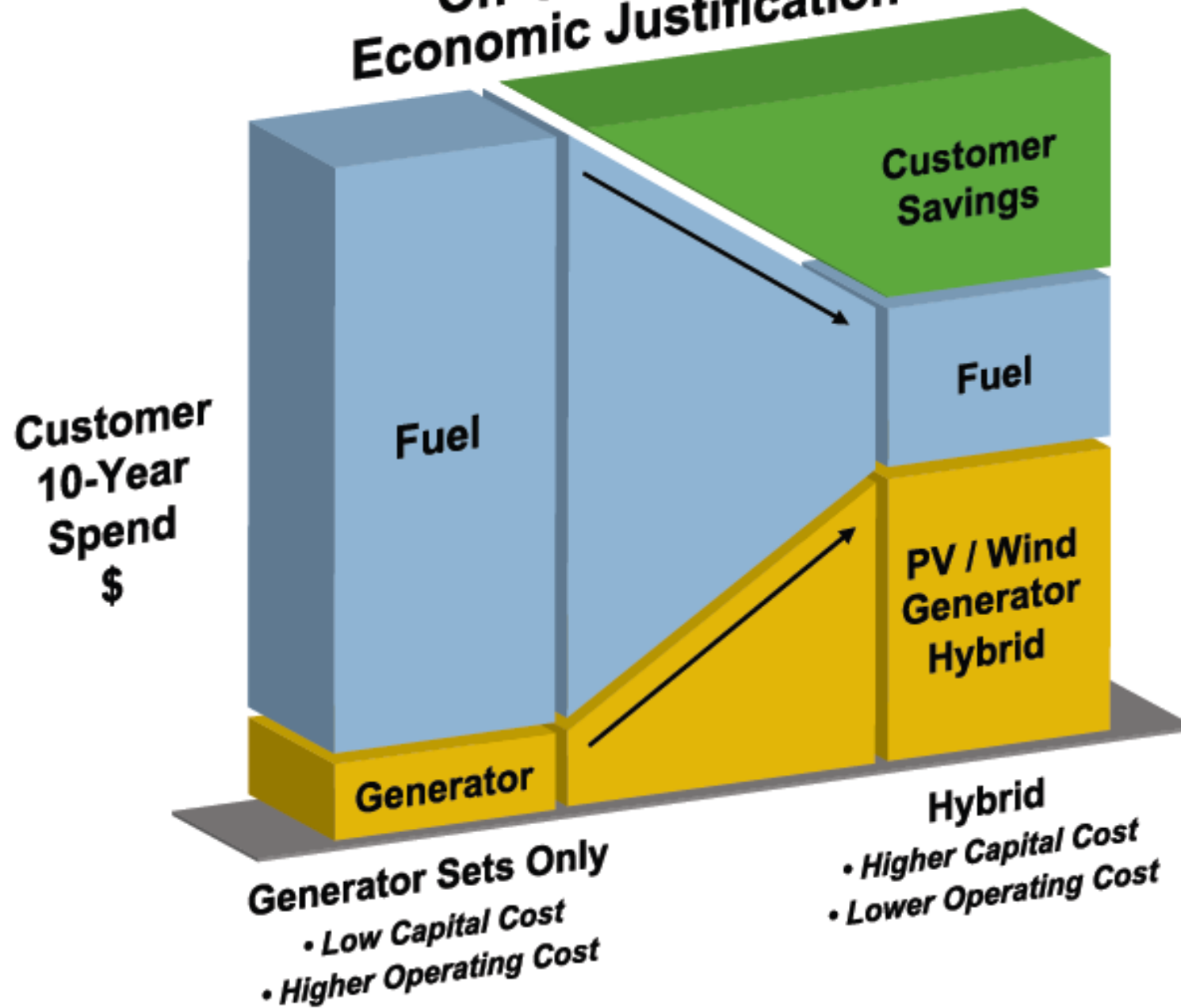
**CAT**  
Energy  
storage



Controls  
**CAT**  
(Microgrid Controller)



# Off-Grid Hybrid Economic Justification







# Caterpillar Hybrid Microgrid Systems Application Examples

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## Weipa Solar Farm, Australia

Site: Weipa, Far North Queensland

Size: 1.7MW(ac)

Owners: First Solar



## Diesel Hybrid Solution Powering a Rio Tinto Bauxite Mine

The total site has 25 MW of CAT generators and will have 6.7MW of PV in stage 2.



# Tucson Proving Ground, Arizona 500kWp



## Full Hybrid Microgrid - Mining Site

- 500kWp Solar Panels - fixed tilt & tracker
- Solar Inverters
- CAT Diesel Generators
- 500kW Li-Ion & UCaps Energy storage





# Orange Telecom, Jordan

**Before**



**After**



## Nanogrid

### Before:

- 2 diesel gensets

### After:

- Solar
- Energy Storage (intermittency and time shift)
- 1 standby duty diesel generator set

### Benefits

- >99% fuel consumption reduction
- Redundant power sources provide >99% uptime

# SAGE, US army Hybrid Microgrids



<https://www.youtube.com/watch?v=1HKuDPhQebE>

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# Conclusions

- Hybrid Microgrid solutions permit lower levelized cost of electricity
- Multiple small Microgrids can be quickly and cost effectively implemented in off-grid and weak-grid locations.
- CATERPILLAR provides fully integrated Hybrid Microgrid solution
  - Generator set
  - Photovoltaic system
  - Energy Storage
  - Service







**THANK YOU**

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