SUMITOMO ELECTRIC

Project of LCET Program in Morocco
“ Demonstration of RF Battery and CPV”

SUMITOMO ELECTRIC INDUSTRIES, LTD.

April 17, 2018

About Sumitomo Electric Industries

Company Profile

Established	April 1897
Employees	248,330
Net Sales	US$ 25.1 billion (FY2016)
Operating Income	US$ 1.3 billion (FY2016)

Business Segment

Automotive

■ Wiring Harnesses, High Voltage Harnesses for HEVs, Heater Control Panels, etc.

Environment & Energy

■ Wire Rods, Porous Metals CELMET®, Magnet Wires, Power Cable, etc.

Information & Communications

■ Optical Fiber Cable, Optical Transceivers, Traffic Control Systems, etc.

Electronics

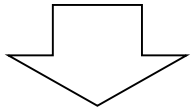
■ Flexible Printed Circuits (FPC), Thunderbolt Cables, Polyimide Tube Rollers, etc.

Industrial Materials

■ Cemented Carbide Tools, Cutting Tools, Nano-Polycrystalline Diamond, etc.

Issues Caused by Mass Deployment of PV/CPV

- Significant surplus electricity during the daytime
  → degrade the stability of the grid and may lead to outage (Fluctuation of frequency and voltage)
- Shortage of electricity in the evening due to the high demand of electricity



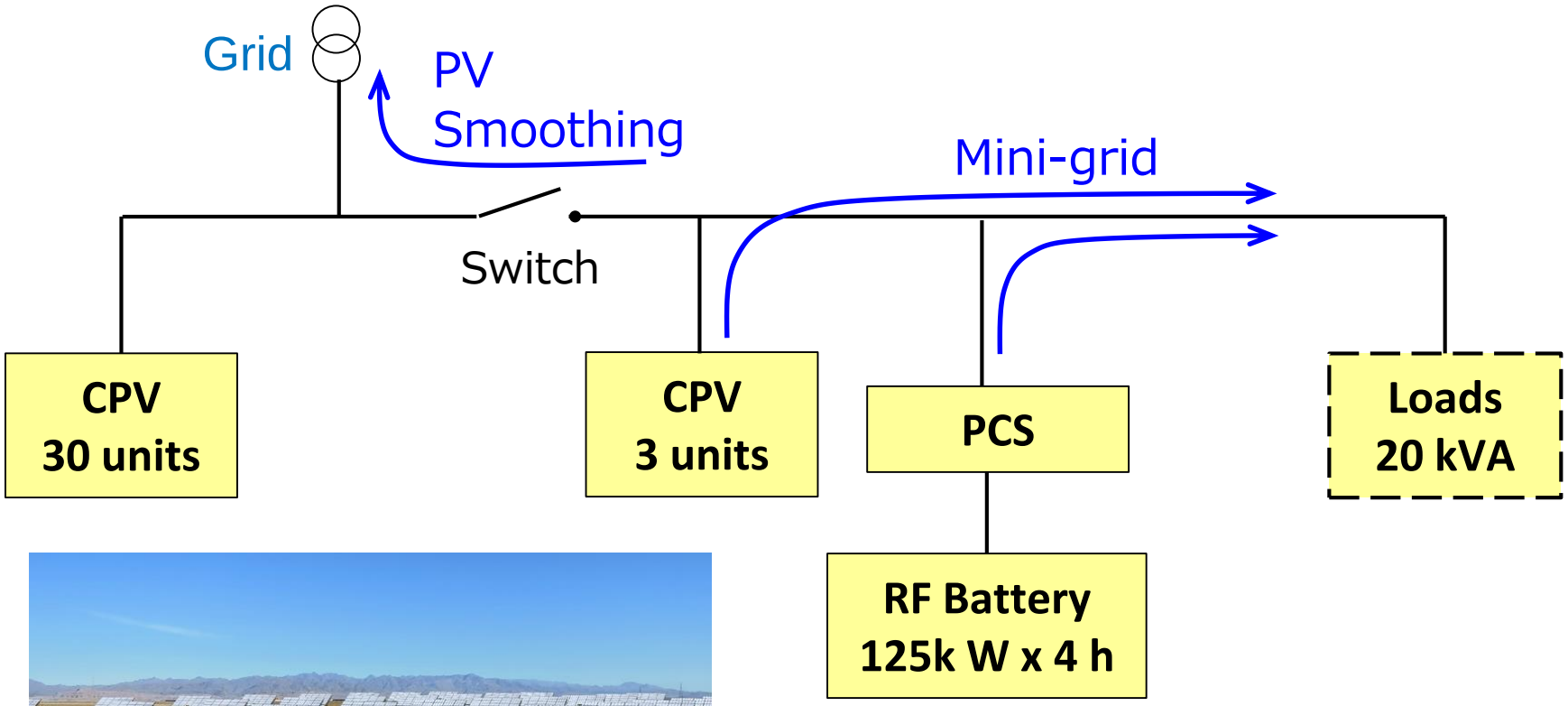
Needs of battery storage
Redox Flow battery with long life and no chance of fire is expected for energy storage

1 MW CPV in Ouarzazate, Morocco

Characteristics of CPV(Concentration PV)

- High efficiency cell with compound semiconductor(GaAs based) applied
  - Twice higher efficiency than Si, and increasing year by year
- Less degradation of output power at high temperature compared with Si

Outline of LCET Program (Demonstration of Redox Flow Battery with CPV)



Redox Flow (RF) Battery

Switch ON : Grid connected model

OFF : Isolated Mini-grid model

Installed in 2018 and start operation in Jan. 2019

Purpose of the Project and Future Plan

① Demonstrate the following items;

- Cut the peak of the CPV output to the grid with RF battery
- Store the surplus electricity from CPV in the daytime and use it in the night
- Operate RF battery and CPV and supply stable electricity to the loads without grid connection

② Evaluate with neutral organization, UNIDO, and show the performance in the world

③ Obtain market information through UNIDO, find projects in Morocco and neighboring countries

④ Deploy the technology, and sell the equipment in those countries