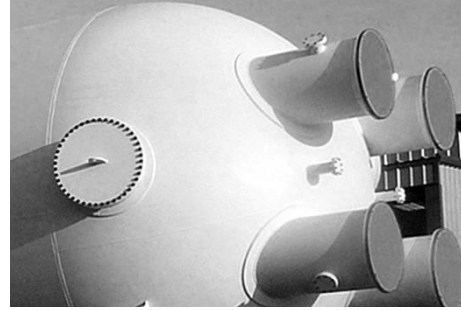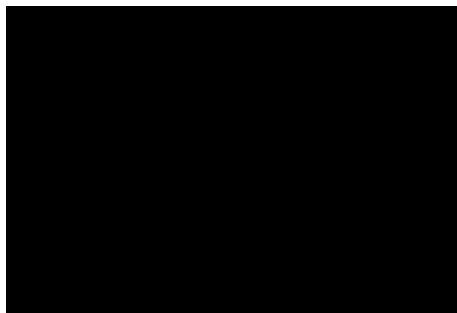# 2018 User Symposium

## 1F-5 PPC Refresh

# 1F-5 PPC System Refresh

- **GE Designed BWR-4 (same as 1F-2, 1F-3 and 1F-4)**

- **Replacement of Original system by TEPSCO and Scientech started in Oct 2009**

- **In final stages of commissioning the replacement system at the time of the earthquake and tsunami at Fukushima Daiichi**

  – Hardware fully installed

  – Software mostly installed

- **R*TIME Functions of 1F-5 PPC**

  **( Usual BWR PPC function)**

  – Redundant System

  – RTP I/O Interface ( apx AI :2000 DI:1000 )

  – Calculations / Alarming / Archive…

  – Other External system Interface

  – BOP Calculation

  – Site Specific Displays

# 3.11 Accident ( Earthquake and Tsunami )

- **1F-5 unit not operating, in final stages of completing a refueling and maintenance outage.**

- **Replacement 1F-5 PPC fully installed and in final stages of testing.**

- **Units 1F-5 and 1F-6 experienced minimal damage from the Tsunami**
    - Safety related system worked well for shutting down
    - Units maintained emergency backup power from one diesel generator
    - Units are located at a higher elevation relative to sea level than units 1F-1 through 1F-4

# 1F-5 PPC System Functions (Post Accident)

- **R\*TIME Functions of 1F-5 PPC**

  **After the accident, unit 5 remained shut down so many of points and functions were not used**

  - Basic R\*Time system ( Redundant / Calculation / Alarming…)

  - Many of RTP I/O Points without monitoring (75% points unused)

  - Also many external Interfaces not used

# 1F-5 PPC System Functions (Post Accident)

- **R*TIME Functions of 1F-5 PPC not used**

  - ~~Engineering Server Interface (PSS)~~

  - ~~RWM~~

  - ~~TRA Interface~~

  - ~~CMS Interface~~

  - ~~External Transmission System Interface~~

  - ~~Modbus Interface (Megawatt Meter)~~

  - ~~BOP (Calculation, Log, Display and Report)~~

  - ~~Site Specific Displays for operating~~

# 1F-5 PPC Refresh

- **Reduced function PPC system required for data monitoring through decommissioning**

- **Project Initiated in DEC/2017 to refresh 1F-5 PPC System**

- **Minimum Cost and Period were required**

- **Virtual Machine Configuration Selected**

# 1F-5 PPC Refresh (Upgraded Components)

- **Upgraded Hardware / Software**

  – PPC Servers Hardware ( DC Servers )

  FUJITSU PRIMERGY RX2540 M4

  – PPC Server Software ( Virtual Environment )

  VMWare ESXI

# 1F-5 PPC Refresh (Maintained Components)

- **Software Upgraded**

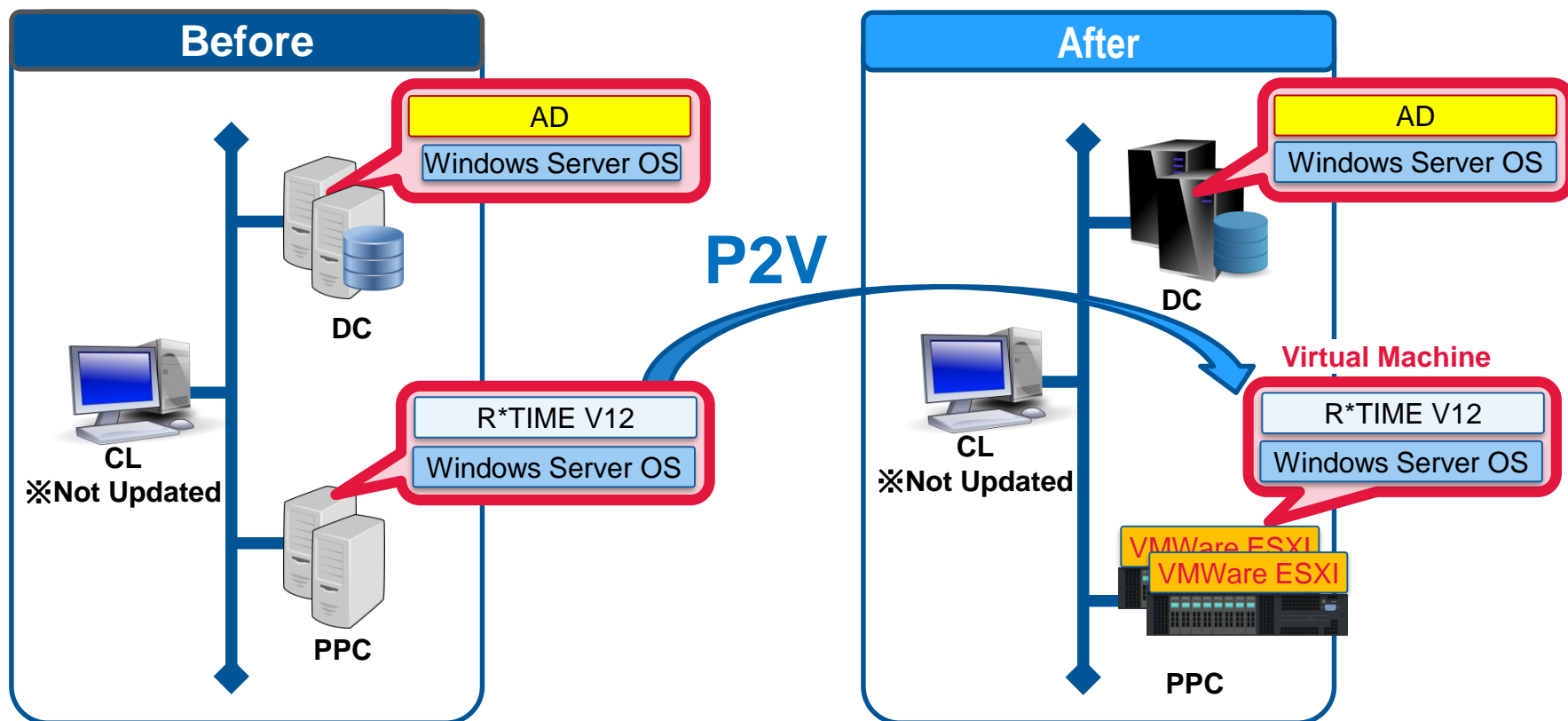  **R*Time software was not upgraded basically**

  – Upgraded software were below

  – System monitoring ( for New Server)

  – Interpretive Calculations ( Eliminated MKS Toolkit ,LEX and YACC)

    License was tied to original PPC server hardware and could not be transferred to replacement hardware

# 1F-5 PPC Refresh (Refresh Image)
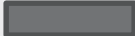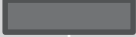
- ## H/W Refresh Image
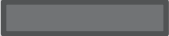
  - Prepare New Phisical Servers
  - P2V R*TIME Server, Create New AD Server



**Before**

AD
Windows Server OS

DC

CL
※Not Updated

R*TIME V12
Windows Server OS

PPC

**P2V**

**After**

AD
Windows Server OS

DC

Virtual Machine

R*TIME V12
Windows Server OS

CL
※Not Updated

VMWare ESXI
VMWare ESXI

PPC

# 1F-5 PPC Refresh Schedule

- **Project Duration 4 months**
  - Start 12 / 2017    Complete  03 / 2018

| | 2017 | 2018 | | |
|---|---|---|---|---|
| | DEC | JAN | FEB | MAR |
| H/W Design Setting-Up ( Fujitsu ) | ▮ | ▮ | | |
| VM Ware Config ( Software house ) | | ▮ | | |
| R*Time Config ( TEPSCO) | | | ▮ | |
| FAT ( TEPSCO / Sientech ) | | | | ▮ |
| SAT ( TEPSCO ) | | | | ▮ |

CURTISS-WRIGHT

TEPSCO

# 1F-5 PPC Refresh Issues

- **VM Configuration did not support most system monitoring data ( SNMP ) for the server computers so monitor alternative way**

  – Fans

  – Power Supplies

  – Other OEM specific data

- **Calculation**

  – MKS Toolkit, LEX and YACC did not run  at Virtual Environment so select alternative executable

    Original SW licenses tied to PPC server hardware and could not be transferred.

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**TEPSCO**

- **RTP 2300 I/O Equipment Verification**

  - TEPCO / TEPSCO does not have RTP 2300 I/O equipment in development system

  - VM images created and sent to Scientech for testing using Scientech equipment

    o Significant difficulty in creating and transferring VM images to Scientech but testing was well done

# PPC Replacement Issues ( common 1F-5 and 6)

- **Entire 1F Site Considered an RCA**

  – RWP and dosimetry required to work in 1F-5 and 6 computer room and control room

  – Limitation on number of work hours per day

- **Resources**

  – Concurrent with 1F-5/6 PPC projects so assigned engineers more efficiently