IBM Energy & Utilities Industry

Reference Architecture for the Integration of Distributed Energy Resources

Steve Thiel

Charles Vincent

The convergence of increased climate change concerns, customer involvement and technology will accelerate the need for integrated and controllable DER resources

Increased Climate Change Concerns

Increased Customer Involvement

Technology Evolution

Stratification of Traditional Customer Base

1

Frugal Goal-Seeker (FG)	Energy Stalwart (ES)
Passive Ratepayer (PR)	Energy Epicure (EE)

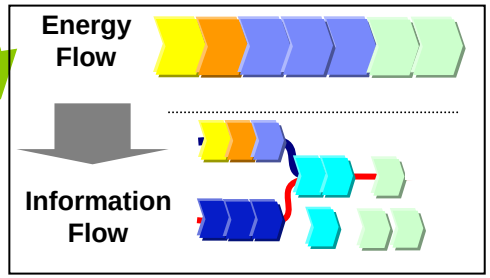
Shifts in Business Models

2

Operations Transformation (OT)	Participatory Network (PN)
Passive Persistence (PP)	Constrained Choice (CC)

Transformation of Industry Value Chain

3



Source: IBM Institute for Business Value (IBV) analysis

EPRI DER Architecture Effort Scope

Develop basic initial "work streams" and use cases that identify high level functional and non functional requirements necessary for real time T&D operations to integrate significant penetration of Distributed Energy Resources (DER)

- Embedded Storage Control
- Embedded Generation Control
- Embedded Auxiliary Services Control
- Direct Load Control

Scope

IBM will evaluate and incorporate not only support for existing distributed resource applications but also position the infrastructure to support future integration requirements. Scenarios will include evaluation of enabling the following future integration requirements:

- System Protection (response in seconds vs. minutes, hours)
- Green House Gas mitigation
- Heterogeneous power quality and reliability
- Address increase security threats
- Address demands on over-stressed and aging power delivery infrastructure
- Dynamic Pricing

Tasks

- Task 1: Develop and/or evaluate case studies with real-life examples of instances when emerging requirements exceed boundary of capabilities of deployed infrastructure.
- Task 2: Identify emerging requirements for DER communication and control to minimize chances of obsolescence during asset's economic lifetime
- Task 3: Develop basic use cases that identify functional requirements of emerging Distributed Energy Resources (DER).
- Task 4: Identify architectural considerations to leverage infrastructure and communication investements in the face of changing market requirements and opportunities.
- Task 5: Document additional scenarios to ensure added architectural considerations enable new

Thank You & Questions