Consumer Portal Scenario P7

1 Descriptions of Function

All prior work (intellectual property of the company or individual) or proprietary (non-publicly available) work should be so noted.

1.1 Function Name

Name of Function: Utility use of DERSystemControllers and load curtailment in conjunction with net-metering.

1.2 Function ID

IECSA identification number of the function

L-10, L-10.2, L-11, C-5.1

1.3 Brief Description

Describe briefly the scope, objectives, and rationale of the Function

A utility company wants to effectively use the DERSystemControllers (DER) installed in customer sites to reduce its contract power purchase during peak load periods. These customers have signed up for net-metering and there are other customers who have signed up for load curtailment during peak demand periods in return for rebates. The utility would use its internal demand projection models and communications with the DER, along with guaranteed buy-back of power agreements and curtailment of major loads during peak periods, to implement economic peak rate power purchase under its contract power purchase agreements.

1.4 Narrative

A complete narrative of the Function from a Domain Expert's point of view, describing what occurs when, why, how, and under what conditions. This will be a separate document, but will act as the basis for identifying the Steps in Section 2.

A western utility has a residential customer base of 1 million meters. The meters are installed in single-family detached housing (SFD), single-family attached housing (SFA), apartment buildings and mobile homes. The utility wishes to promote the use of renewable resources within its residential and light commercial client base.

The utility has demand relief requirements and has multiple demand response programs in place. It additionally supports active residential conservation programs as well as residential alternate, renewable and distributed generation.

The results of all of these efforts are reported to the PublicUtilityCommision as part of their requirements to receive credit in rate base.

The utility decides to incentivize the residential and light commercial use of DERSystemControllers (DER) by offering a guaranteed buy-back of power under specific conditions. The plan requires the customers to install DER with their own resources and the utility will purchase power delivered to the grid (specified in DER regulations) during periods of high demand.

Additionally the utility offers demand responsive programs wherein customers receive financial incentives for curtailing HVAC, pool pumps, and electric water heaters during peak demand periods.

A specific subset (100 total) of the customers participating in these programs resides on a congested Transmission Service Provider feeder in a specific geographic area of the service territory. Thus it's advantageous for the utility to "involve" these customers during times of peak demand or high purchase power contractual periods.

The issues confronting the utility during seasonal high demand periods are:

➢ They need to know which homes of the 100 have DER installed, the size of the DER (kW) and the type of DER (solar PV, generator, etc.
➢ They need to know which customers have signed net-metering contracts, and which customers participate in incentivized load control programs.
➢ They need to have access to purchase power contract pricing information

The utility enters into a typical high demand period; ambient temperatures are rising and HVAC loads are increasing. The utility has orchestrated a "smart system" approach and goes through the following procedures.

1. The utility interrogates primary line meters on the Transmission Service Provider feeder and starts to continuously monitor line loading. The utility has developed a model to assess the primary MeterDevice load ramp and can predict when the feeder will become overloaded at the monitored rate-of-change. The model predicts that at the present rate of change the line will become critical within one hour.
2. Based on this fact, the utility calls up an internal database for that specific geographic area and determines which customers have DER and how much they have (kW). Based on the database results the utility interrogates the customer portals to assess which units are already on line and which ones are available to be called up (available units must provide an "availability" signal as part of their contract with the utility).
3. The utility notifies the customers that specific DER units will be called up within 30 minutes. The DER is called on line at a specific time and the contractual buy-back rate goes into effect (the rate is guaranteed at 90% of purchase power at that time

period, with the 10% differential going into system O&M). Thus the utility is now buying DER power at 90% of a purchase power rate that is determined by calling up the utility's purchase power contracts interactive spot-power database.

4. The customers net-meters are now supplying the utility enterprise with delivered power for a prescribed time that must be credited to the customer's account and eventually show up on their monthly invoice as a credit.

5. The utility continues to monitor the primary meters and determines that the acquired DER has slowed the rate of change, but the system will still overload during the peak demand period. Thus it decides to curtail customers participating in ongoing demand reduction programs.

6. The utility interrogates the specific customers on the feeder and determines which customers have controllable loads that are in service. The utility sends out a signal that advises of an upcoming curtailment and then reads the primary MeterDevice just before the curtailment signal is sent, and 15 minutes after the curtailment signal is sent.

7. The utility determines that the peak demand problem has been averted and does not elect to purchase expensive power under contract.

8. The billing department now calculates the amount of money to re-imburse each DER participating customer based on agreed upon rates and for the measured time period.

9. The billing department calculates the amount of incentives to pay each of the participating DSM customers. Free-riders are subtracted from the customers to be rewarded as are those that overrode the event (an option of the program.)

1.5 Actor (Stakeholder) Roles

Describe all the people (their job), systems, databases, organizations, and devices involved in or affected by the Function (e.g. operators, system administrators, technicians, end users, service personnel, executives, SCADA system, real-time database, RTO, RTU, IED, power system). Typically, these actors are logically grouped by organization or functional boundaries or just for collaboration purpose of this use case. We need to identify these groupings and their relevant roles and understand the constituency. The same actor could play different roles in different Functions, but only one role in one Function. If the same actor (e.g. the same person) does play multiple roles in one Function, list these different actor-roles as separate rows.

Grouping (Community) ’		Group Description
Customer Site		*Those entities that are located at customer's premises*
Actor Name	*Actor Type (person, device, system etc.)*	*Actor Description*
Customer	Person	One signed up to participate in the DERSystemController (DER) program.
CustomerCommun icationPortal	System	System handling communications function at customer's premises [in this case, communications with the installed DER, net-MeterDevice, power quality system and the utility's DER operations]
NetMeterDevice-MeterDevice	Device	Device that can measure and transmit the net flow of power to the customer [i.e., it measures power flow in both directions – into the customer premises from the utility and out to the utility from customer premises – and generates a net MeterDevice data that can be used by the utility to bill the customer accordingly]
DERSystemContro ller	System	System at the customer site that generates power and is set up to be brought online at the demand of the utility company
Meter Device	System	System for transmitting MeterDevice data on demand to the utility.
DLCSwitchContro ller	Device	Device performing cycling of major load, such as the air conditioning unit, pool pump heater, etc

Replicate this table for each logic group.

Grouping (Community) '		Group Description
Load Serving Entity DERSystemController Operations		Those entities that are charged with managing the DERSystemController functions for the power company to optimize the loading of the Transmission & Distribution grid
Actor Name	Actor Type (person, device, system etc.)	Actor Description
DERSystemController	System	DERSystemController Center: System at the power company that handles DER operations [such as the system load model, decisions on when to initiate DER activities, triggering communications with other utility departments and the DER program participants, etc]
LineMeterDevice	Device	Device that measures loading of feeder line in specific Transmission Service Provider grid sectors of the utility
Transmission & Distribution Feeder	System	System that handles the Transmission Service Provider function to specific geographic sector in utility's service area.
DERDatabase	System	System that contains information about customers participating in the DER program, their location, details of their system (such as DER installed, the size of the DER (kW) and the type of DER (solar PV, generator, etc)), whether they have signed net-metering contract, and so on.
CustomerBillingSystem	System	System that handles generation of bills for the services provided to the customer
CustomerId	Device	A common customer identification key that is used by service providers authorized by the customer to identify all of their service accounts
CustomerInformationDatabase	System	System that contains information about customer accounts of the power company
DemandReductionProgramDatabase	System	Demand Reduction Program [DemandReductionProgramDatabase] Database: System that contains information about all of the Demand Reduction Programs offered by the

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Grouping (Community) '		Group Description
Load Serving Entity DERSystemController Operations		Those entities that are charged with managing the DERSystemController functions for the power company to optimize the loading of the Transmission & Distribution grid
Actor Name	Actor Type (person, device, system etc.)	Actor Description
		utility, participation requirements, equipment details and links to customer billing system for passing incentive information
DemandResponseProgramManager	Person	Person managing the DemandReductionProgramDatabase at the utility
Purchase Power Contracts Interactive Spot-Power Spot Price Database	System	System used by the utility to track and determine the spot price of power that it can purchase under its existing contracts
LoadPredictionModel	System	System that a models feeder load by automatically tracking weather, load and other conditions to project overload events at specific feeder lines and connected to the DER database
Utility Communications Network	System	System responsible for managing communications between the utility and the participants in the DER program [for functions such as remote MeterDevice reading, controlling DER units at customer sites, monitoring net-meters and other related communications activities]

Grouping (Community) '		Group Description
Others		*Those entities that are involved in this activity, but do not fit in any of the Groupings above*

Actor Name	Actor Type (person, device, system etc.)	Actor Description
Metering	Person	Department at the utility that manages meters and their installation at the customer site
Purchasing Selling Entity	Person	Department at the utility company that handles procurement of power resources for the utility company.
PublicUtilityCommission	Person	State Public Utility Commission {PUC): The entity that receives results of the utility's demand reduction program.
Transmission Service Provider	System	Transmission & Distribution (Transmission Service Provider) Grid : System at the utility company that manages the Transmission and Distribution grid for the utility company and monitors for loading factors, etc.
Utility Communications Network	System	System responsible for managing communications between the utility and the participants in the DER program [for functions such as remote MeterDevice reading, controlling DER units at customer sites, monitoring net-meters and other related communications activities].
EnergyServiceProvider		
ServiceProvider		
Specified Loads		
MeterDevice		
Meter Device		

1.6 Information exchanged

Describe any information exchanged in this template.

Information Object Name	Information Object Description
Transmission Service Provider Feeder LineMeterDevice Query	Query from utility's DER Center to Transmission Service Provider feeder line MeterDevice to determine the potential for line overload and generating the trigger to activate the DER program in the affected segment
DER Activation Order	System order to initiate DER ahead of projected line overload, communications to the participating customers to alert the onset of DER, verifying DER availability at each customer site, bringing online selected DER at customer sites, alerting the CustomerCommunicationPortal and net-MeterDevice at each site to record delivered power and flagging the power delivered for appropriate payment by the billing system
DemandReductionProgramDatabase Implementation	System order to alert customers on DemandReductionProgramDatabase to curtail participating loads, track curtailed loads and transmit curtailment information to the system for applying credits on termination of the curtailment order
DER Order Termination	System order to terminate the DER at the customer site based on model projection of averting peak demand problem, crediting each customer for power delivered as per applicable rates, and decision on not purchasing power under contract from other sources

1.7 Activities/Services

Describe or list the activities and services involved in this Function (in the context of this Function). An activity or service can be provided by a computer system, a set of applications, or manual procedures. These activities/services should be described at an appropriate level, with the understanding that sub-activities and services should be described if they are important for operational issues, automation needs, and implementation reasons. Other sub-activities/services could be left for later analysis.

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Activity/Service Name	Activities/Services Provided
Determine Potential Feeder Peak Load Problem	Based on ambient temperatures and HVAC loads crossing the threshold values, trigger a query to utility feeder load model to determine if a specific feeder line will face overload problem; if the model predicts potential overload problem, trigger activation of DER activities for that sector
Initiate DER Program Activation	Initiate actions to activate DER program activities for the targeted feeder line: query DER database to flag DER customers in the affected segment, identify amount of power (kW) available from registered DER from customers in that segment, generate a query to those customers to determine their DER system availability and generate an alert to those with available DER system to indicate potential program activation within 30 minutes
Implement DER	Activate DER systems at customers already alerted and with available systems, alert the CustomerCommunicationPortal and net-meters at those locations to record power delivered and duration of power delivery, activate PQ monitoring of delivered power to verify compliance with system requirements, drop non-complying units from the grid and flag for notice after the event, track feeder load to determine timing for program termination and hold-off contract power purchase on spot market during the DER program period
Implement DemandReductionProgramDatabase	On indication by the power model to initiate load shedding, contact customers participating in the DemandReductionProgramDatabase to alert them about load curtailment in 15 minutes, curtail specified loads, monitor the duration and load curtailed, and continue the curtailment till system requests termination of the DemandReductionProgramDatabase event
Terminate DER and DemandReductionProgramDatabase	On indication by the power model of the end of the projected overload problem for the feeder line, send out a trigger to customer DER systems supplying power to terminate operation, record power supplied and duration of power supply, send out trigger to DemandReductionProgramDatabase customers to turn on curtailed load, finalize decision not to buy power under spot-market purchase contract and revert system back to monitoring mode for next overload situation
Complete Post-DER and DemandReductionProgramDatabase Program Activities	Initiate actions to transmit net-metering data to billing to generate credit to customers for the power supplied at the contractual buy-back rate, transmit curtailed load and curtailment duration for participating DemandReductionProgramDatabase customers to the billing system for applying applicable incentive credits, and notify all customers in the DER program and DemandReductionProgramDatabase

Activity/Service Name	Activities/Services Provided
	that the current DER and DemandReductionProgramDatabase event has been successfully terminated

1.8 Contracts/Regulations

Identify any overall (human-initiated) contracts, regulations, policies, financial considerations, engineering constraints, pollution constraints, and other environmental quality issues that affect the design and requirements of the Function.

Contract/Regulation	Impact of Contract/Regulation on Function
DER Program Tariffs	Specifications of DER equipment installed at customer site, net-metering equipment at customer site, contractual buy-back rates, PQ acceptance criteria and power supply credits applied to customer bill
Demand Reduction Program Tariffs	Equipment installed at customer site, cycling regime implemented and incentive rewards applied to customer bill

Policy	From Actor	May	Shall Not	Shall	Description (verb)	To Actor
Install DER Equipment	Customer			X	Customer needs to install DER system at site to participate in the program	EnergyServiceProvider
Install NetMeterDevice-Meter	EnergyServiceProvider			X	Install specified net-metering equipment at customer site	Customer
Activate DER	EnergyServiceProvider	X			Activate and bring online customer's DER	Customer
Participate in DemandReductionProgramDatabase	Customer	X			Customer needs to agree to participate in the DemandReductionProgramDatabase and permit the utility to curtail specified loads during peak demand periods	EnergyServiceProvider
Buy-back Power During DER Event	EnergyServiceProvider			X	Utility shall buy-back power at contract rates from customer's DER during a DER event if the customer's delivered power meets PQ criteria	Customer

Cycle Energy to Equipment	EnergyServiceProvider	X			Cycle power to air conditioning unit on utility trigger	Specified Loads
Provide Load Control Equipment	ServiceProvider			X	Install specified equipment at customer site	Customer
Provide Incentive Rewards	EnergyServiceProvider			X	Provide incentive reward on customer energy bill	Customer

Constraint	Type	Description	Applies to
Program Participation	System Availability	A customer can participate in a given DER event only if the DER system is in "available" state	Selecting customer for DER participation
Load Curtailment	Turn Off Loads	Customer to permit specified major loads [such as HVAC, Pool Pump, etc] to be turned off by the utility	Customer's eligibility for participation in the program to receive incentives
Reward Period	Inactive	Months of the year when the program is not active [i.e., non-summer months for this program]	No incentive reward provided
Energy Usage	Minimum Threshold	Tracked energy usage to meet or exceed program requirements to qualify to participate in the program and receive incentive reward on bill	Eligibility to continue participation in the program
Power Buy-back	Buy-back Rate	On DER program activation and customer DER meeting availability criteria, the utility is obligated to buy-back power at 90% purchased power rate at that time	Rate paid by the utility to customer for power delivered to the grid

2 Step by Step Analysis of Function

Describe steps that implement the function. If there is more than one set of steps that are relevant, make a copy of the following section grouping (Preconditions and Assumptions, Steps normal sequence, and Steps alternate or exceptional sequence, Post conditions)

2.1 Steps to implement function

Name of this sequence.

2.1.1 Preconditions and Assumptions

Describe conditions that must exist prior to the initiation of the Function, such as prior state of the actors and activities

Identify any assumptions, such as what systems already exist, what contractual relations exist, and what configurations of systems are probably in place

Identify any initial states of information exchanged in the steps in the next section. For example, if a purchase order is exchanged in an activity, its precondition to the activity might be 'filled in but unapproved'.

Actor/System/Information/Contract	Preconditions or Assumptions
DER Equipment	Assumes that the customer has installed DER equipment that will be made available to utility on demand
DER Program tariff	Assumes that a tariff exists with details of program requirements and buy-back rates that the customer can sign up
DERDatabase	Assumes that the utility has a database with customer DER information keyed to feeder and geographic information
CustomerCommunicationPortal	Assumes that the CustomerCommunicationPortal is installed in the customer location that will permit communications with the customer and DER equipment, enable communication with DLC and specified loads to implement curtailment and permit monitoring of curtailed

Actor/System/Information/Contract	Preconditions or Assumptions
	loads
NetMeterDevice	Assumes a net-MeterDevice has been installed at customer site to monitor power delivery to the grid
Feeder LoadPredictionModel	Assumes that a model is available to the utility to automatically track weather, load and other conditions to project overload events at specific feeder lines and connected to the DER database
CustomerId	Assumes that a common customer id is used by the customer service, Demand Reduction Program, DER and billing departments
Demand Reduction Program tariff	Assumes that a tariff exists with details of program requirements and incentive rewards that the customer can sign up

2.1.2 Steps – Normal Sequence

Describe the normal sequence of events, focusing on steps that identify new types of information or new information exchanges or new interface issues to address. Should the sequence require detailed steps that are also used by other functions, consider creating a new "sub" function, then referring to that "subroutine" in this function. Remember that the focus should be less on the algorithms of the applications and more on the interactions and information flows between "entities", e.g. people, systems, applications, data bases, etc. There should be a direct link between the narrative and these steps.

The numbering of the sequence steps conveys the order and concurrency and iteration of the steps occur. Using a Dewey Decimal scheme, each level of nested procedure call is separated by a dot '.'. Within a level, the sequence number comprises an optional letter and an integer number. The letter specifies a concurrent sequence within the next higher level; all letter sequences are concurrent with other letter sequences. The number specifies the sequencing of messages in a given letter sequence. The absence of a letter is treated as a default 'main sequence' in parallel with the lettered sequences.

Sequence 1:

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1.1 – Do step 1
1.2A.1 – In parallel to activity 2 B do step 1
1.2A.2 – In parallel to activity 2 B do step 2
1.2B.1 – In parallel to activity 2 A do step 1
1.2B.2 – In parallel to activity 2 A do step 2
1.3 – Do step 3
1.3.1 – nested step 3.1
1.3.2 – nested step 3.2
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Sequence 2:

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2.1 – Do step 1
2.2 – Do step 2
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#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments
#	*Triggering event? Identify the name of the event.[1]*	*What other actors are primarily responsible for the Process/Activity? Actors are defined in section0.*	*Label that would appear in a process diagram. Use action verbs when naming activity.*	*Describe the actions that take place in active and present tense. The step should be a descriptive noun/verb phrase that portrays an outline summary of the step. "If …Then…Else" scenarios can be captured as multiple Actions or as separate steps.*	*What other actors are primarily responsible for Producing the information? Actors are defined in section0.*	*What other actors are primarily responsible for Receiving the information? Actors are defined in section0.* (Note – May leave blank if same as Primary Actor)	*Name of the information object. Information objects are defined in section 1.6*	*Elaborate architectural issues using attached spreadsheet. Use this column to elaborate details that aren't captured in the spreadsheet.*	*Reference the applicable IECSA Environment containing this data exchange. Only one environment per step.*
1.1	Transmission Service Provider Feeder LineMeterDevice Query	DERSystem Controller	Demand data and HVAC load data	DER system receives ambient temperature, demand data and HVAC load data	Utility Transmission Service Provider data	DERSystemC ontroller	Ambient temperature and load data exceeding specified threshold values		DER Monitoring and Control
1.2		DERSystem Controller	Check feeder overload projection	DER system queries utility's load prediction model	DERSystemC ontroller	LoadPredictio nModel	System data for use by the model		DER Monitoring and Control
1.3		LoadPredict ionModel	Identifies line at risk of overload	Load prediction model identifies feeder line at risk of overload event	LoadPredictio nModel	DERSystemC ontroller	Information identifying feeder at risk		DER Monitoring and Control
1.4	Identifies feeder line at risk of overload	DERSystem Controller	Activates DER program for identified feeder line	DER system generates trigger to activate DER program for the identified feeder line	DERSystemC ontroller	DERDatabase	Activation trigger for DER program activities		DER Monitoring and Control
2.1	DER and	DERSystem	DER system	DER system queries	DERSystemC	DERSystemC	Amount and		DER

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[1] Note – A triggering event is not necessary if the completion of the prior step – leads to the transition of the following step.

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments
	DemandReductionProgram Database Activation Order	Controller	determines DER capacity	DER database to determine power capacity from customers in the affected segment	ontroller, Transmission Service Provider system, DERDatabase	ontroller	types of power that can be obtained from the customers participating in the DER program		Monitoring and Control
2.1.1		DERSystem Controller	Actual available power from the targeted customers	DER system signals identified customers to determine availability	DERSystemC ontroller, CustomerCo mmunication Portal, DERSystemC ontroller	DERSystemC ontroller	Actual available power from the targeted customers		DER Monitoring and Control
2.1.2	DER systems signals to check for availability	DERSystem Controller	Activation alert to customers on pending program activation	DER system alerts customers with available power on system activation in 30 minutes	DERSystemC ontroller	CustomerCo mmunication Portal, DERSystemC ontroller	Activation alert to customers on pending program activation		DER Monitoring and Control
2.2		DERSystem Controller	Signal to turn on DER equipment at available customer sites	DER system turns on DER equipment at targeted customers' sites	DERSystemC ontroller	CustomerCo mmunication Portal, DERSystemC ontroller	Signal to turn on DER equipment at available customer sites		DER Monitoring and Control
2.3		DERSystem Controller	Record energy delivered to the grid	Alert CustomerCommunicati onPortal at conforming DER customers to record power delivery	DERSystemC ontroller	CustomerCo mmunication Portal, Customer NetMeterDev	Information on amount of power and duration of power delivered to the grid		DER Monitoring and Control

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#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments
						ice-MeterDevice			
2.4		DERSystem Controller	Delay buying power on spot-market	Signal Purchasing Selling Entity to delay spot-market power purchase	DERSystemC ontroller	Purchasing Selling Entity	Delay buying decision for power purchase on spot-market		DER Monitoring and Control
2.5		DERSystem Controller	Determine contract power buy-back rate	Query utility's spot-market power database to determine contract power rate	Purchase Power Contracts Interactive Spot-Power Spot Price Database -	DERSystemC ontroller, DERDatabase , CustomerBilli ngSystem	Power buy-back rate applicable to power from customer DER to utility grid		DER Monitoring and Control
2.6		DERSystem Controller	On-going tracking feeder overload	On-going tracking feeder overload condition and load prediction model	LoadPredictio nModel and Transmission Service Provider Grid	DERSystemC ontroller	Status data indicating the need for DER power from customers		DER Monitoring and Control
2.7		DERSystem Controller	Identify DemandReduc tionProgramDa tabase participating customers	Generate query to DemandReductionProg ramDatabase Database to identify participating customers in the affected grid line	DemandRedu ctionProgram Database	DERSystemC ontroller	List of customers participating in the DemandReducti onProgramDatab ase load curtailment program		DER Monitoring and Control
2.7. 1		DERSystem Controller	Trigger DemandReduc tionProgramDa tabase load	Trigger DemandReductionProg ramDatabase load curtailment alert signal	DemandRedu ctionProgram Database	CustomerCo mmunication Portal and DLCSwitchC	Signal alerting identified customers of load curtailment		DER Monitoring and Control

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments
			curtailment alert	to participating DemandReductionProgramDatabase customers		ontroller			
2.7.2	Trigger DemandReductionProgram Database load curtailment alert	DERSystem Controller	Monitor load curtailment	Monitor load curtailment in progress [to ensure customer has not chosen to override the curtailment]	DemandReductionProgram Database	CustomerCommunication Portal, DLCSwitchController and MeterDevice	Verify load curtailment for the duration of the event		DER Monitoring and Control
2.7.3		DERSystem Controller	Record of curtailment at details at customer site	Alert CustomerCommunicationPortal to record duration and details of load curtailed	CustomerCommunication Portal	MeterDevice and DLCSwitchController	Record of curtailment at details at customer site		DER Monitoring and Control
3.1	Monitor T&D data	DERSystem Controller	Predict if DER program and DemandReductionProgramDatabase can be terminated	LoadPredictionModel and T &D data indicate DER and DemandReductionProgramDatabase activation can be terminated	LoadPredictionModel and Transmission Service Provider Grid	DERSystemController	Trigger to initiate DER event termination		DER Monitoring and Control
3.2	DER program and DemandReductionProgram Database can be terminated	DERSystem Controller	DERSystemController initiates termination sequencing	DERSystemController initiates orderly sequencing DER program and DemandReductionProgramDatabase event termination	DERSystemController, DERDatabase	CustomerCommunication Portal, DERSystemController	Message to customer DER unit on shutdown schedule		DER Monitoring and Control
3.2.		DERSystem	Transmit DER	Transmit DER turn-off	DERSystemC	CustomerCo	Signal to		DER

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments
1		Controller	turn-off signal	signal to each customer as per the schedule	ontroller	mmunication Portal, DERSystemController	individual DER unit to terminate power delivery		Monitoring and Control
3.2.1.1	Transmit DER turn-off signal	DERSystem Controller	Confirmation of power delivery turn-off	Confirmation by customer unit of power delivery termination	CustomerCommunication Portal, DERSystemController	DERSystemController	Positive acknowledgment of system turn-off		DER Monitoring and Control
3.2.2	Transmit DemandReductionProgram Database Order Termination	DERSystem Controller	Transmit signal to turn on curtailed loads	Transmit signal to turn on curtailed loads to participating customers	DemandReductionProgram Database	CustomerCommunication Portal, DLCSwitchController	Signal to terminate load curtailment activity		DER Monitoring and Control
3.2.2.1	Transmit signal to turn on curtailed loads	DERSystem Controller	Confirmation of load curtailment	Confirmation of customer of terminating load curtailment	CustomerCommunication Portal	DERSystemController	Positive acknowledgment of DemandReductionProgramDatabase event termination		DER Monitoring and Control
3.3		DERSystem Controller	Power delivered during DER event	Customer site transmits net power delivery during DER event	CustomerCommunication Portal, Customer NetMeterDevice-MeterDevice	DERDatabase	Details of amount of power delivered, duration of power delivered during the DER event		DER Monitoring and Control

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments
3.3.1		DERSystem Controller	Generate power delivery and rate information	Delivered power information and applicable rate data sent to billing system	DERSystemController, DERDatabase	CustomerBillingSystem	Amount and details of credit to be issued to customer for power delivered during the DER event		DER Monitoring and Control
3.3.1.1		DERSystem Controller	Amount of power purchase avoided due to DER program	Delivered power by customer DER units and peak load averted data to Purchasing Selling Entity	DERDatabase	Purchasing Selling Entity	Amount of power purchase avoided due to DER program activation		DER Monitoring and Control
3.4	DemandReductionProgram Database Event	DERSystem Controller	Customer site transmits DemandReductionProgramDatabase event data	Customer site transmits curtailed load data during the DemandReductionProgramDatabase event	CustomerCommunication Portal, Meter Device	DemandReductionProgram Database	Details of loads curtailed, duration of curtailment, and amount of power consumption saved		DER Monitoring and Control
3.4.1		DERSystem Controller	Customer site transmits DemandReductionProgramDatabase event data for billing	Curtailed load and duration information to billing system	DemandReductionProgram Database	CustomerBillingSystem	Amount of credits to be applied to customer for load curtailed during the DemandReductionProgramDatabase event		DER Monitoring and Control
3.4.1.1		DERSystem Controller	Amount of power	Peak load demand averted data to	DemandReductionProgram	Purchasing Selling Entity	Amount of power purchase		DER Monitoring

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments
			purchase avoided due to DemandReductionProgramDatabase activation	Purchasing Selling Entity	Database		avoided due to DemandReductionProgramDatabase activation		and Control
3.4.2		DERSystem Controller	Signal no additional DER power to be purchased	Signal Purchasing Selling Entity that no additional power needs to be purchased	DERSystemContoller	Purchasing Selling Entity	Finalize decision not to purchase power in spot-power market		DER Monitoring and Control
3.5	DER and DemandReductionProgram Database event	DERSystem Controller	Get credit for DER and DemandReductionProgramDatabase from PublicUtilityCommision	Submit total load averted [from DER program and DemandReductionProgramDatabase activities] to PublicUtilityCommision for awarding rate credits	DERSystemContoller, DemandReductionProgram Database	PublicUtility Commision	Details of power load averted due to the DER Program and DER activities		DER Monitoring and Control

2.1.3 Steps – Alternative / Exception Sequences

Describe any alternative or exception sequences that may be required that deviate from the normal course of activities. Note instructions are found in previous table.

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments

2.1.4 Post-conditions and Significant Results

Describe conditions that must exist at the conclusion of the Function. Identify significant items similar to that in the preconditions section.

Describe any significant results from the Function

Actor/Activity	Post-conditions Description and Results
Consumer	System status information, credit based on net-metered power delivery on next bill and incentive rebates based on load curtailed
Transmission Service Provider Grid	Satisfactory operation having avoided peak demand load event
DERDatabase	Updated with customer DER units that delivered power, and details of power delivery (amount, duration and net-metered amount) during the DER event
Billing system database	Updated with credit to be issued to participating customers for power delivered as per applicable contract rates (90% of contracted spot-market power rates) during the DER event and rebates to be issued to participating customers for loads curtailed during the DemandReductionProgramDatabase implementation
Customer DER Equipment	Updated with status after the DER event
Purchasing Selling Entity	Avoided purchase of power in spot-power market and details of the amount of power purchase avoided
LoadPredictionModel	Updated with actual system performance during the DER/DemandReductionProgramDatabase event for refining future projections

2.2 Architectural Issues in Interactions

Elaborate on all architectural issues in each of the steps outlined in each of the sequences above. Reference the Step by number..

2.3 Diagram

For clarification, draw (by hand, by Power Point, by UML diagram) the interactions, identifying the Steps where possible.

3 Auxiliary Issues

3.1 References and contacts

Documents and individuals or organizations used as background to the function described; other functions referenced by this function, or acting as "sub" functions; or other documentation that clarifies the requirements or activities described. All prior work (intellectual property of the company or individual) or proprietary (non-publicly available) work must be so noted.

ID	Title or contact	Reference or contact information
[1]	P. S. Vishwanath	Paragon Consulting Services, 301-323-4088
[2]	Joe Kelly	Paragon Consulting Services, 503-978-8289

3.2 Action Item List

As the function is developed, identify issues that still need clarification, resolution, or other notice taken of them. This can act as an Action Item list.

ID	Description	Status
[1]		
[2]		

3.3 Revision History

For reference and tracking purposes, indicate who worked on describing this function, and what aspect they undertook.

No	Date	Author	Description
0.1	December 22, 2003	P S V	First draft
0.2	December 30, 2003	P S V	Revisions and updates to missing sections

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