1 The Agent Personalities

2 Each system that uses or provides a resource over time has its own internal processes, and uses these
3 processes to provide the services these systems were created to perform. These internal processes
4 dictate how an agent representing the underlying system comes to market. Each agent exhibits market
5 behaviors that are tied to the underlying physical processes.

6 While a single agent running a single set of code could encompass all behaviors could be created, agents
7 that are optimized for specific types of market behavior can be smaller and more secure. Naming similar
8 market behaviors across systems makes it easier for the integrator to understand how introducing an
9 additional system will affect an existing micromarket/microgrid.

10 The descriptions below refer to electric power for clarity and brevity. The agent behaviors apply to any
11 resource market.

12 The Simple Agent Personalities

13 Each Agent Personality denotes a common set of market behaviors.

14 Homeostatic Agent

15 A homeostatic agent represents a system that consumes power episodically to support it's a purpose
16 external to the resource market. A homeostatic agent schedules power purchases to support providing a
17 service external to the grid.

18 Two examples of systems that would use a Homestatic Agent are an air conditioning system and a
19 refrigerator. Each of them buys power to support processes that support a service external to the grid.
20 Neither wants to run unless it is able to buy the entire power curve it needs for its next cycle. Each could
21 advance or delay its purchases to some, or even skip a cycle, without harming the service it provides.

22 Preconsumption Agent

23 A pre-consumption agent is similar to the homeostatic agent, but it provides an asynchronous server
24 and therefore has a bias to buying only when the price is low. The system is able to increase
25 consumption in the short term to enhance its ability to provide service at a future time. If the
26 refrigerator is a homeostatic agent, the ice-maker may be a pre-consumption agent. There may be
27 overrides to the behavior, i.e., fill up before the party, or high priority when less than a quarter full.

28 Base Consumer

29 Base Consumer uses power continuously when the system it represents is providing a service. An
30 example is a light which is either lit and consuming power, or is unlit and not consuming power. An
31 agent representing one or many lightbulbs on a circuit changes in scale only. A base consumer is almost
32 always a high-priority purchaser in the market.

33 Tiered Consumer

34 A Tiered Consumer differs from a Base Consumer in that it may be able to reduce power consumption
35 by providing a lower level of services. An example is a dimmable light. More power might provide a
36 better service, or a different service. Using for example the dimmable light again, a low level of light
37 might support movement, a high level of light support reading, and a higher level of light support
38 personal grooming.

Base Supplier

A Base Supplier supplies power continuously. A Base Supplier might include any controllable generator with a long cycle time. Long cycle time is situationally defined.

Market-Driven Supplier

A Market Driven Supplier supplies power intermittently, based on interactions within the microgrid.

Intermittent Supplier

An Intermittent Market Supplier supplies power intermittently, based upon inputs external to the microgrid. An example is a photovoltaic system, which generates power when the sun shines.

Storage Agent

A Storage Agent is able to consume resources later supply the same resource. It stores power. This is similar to a system able to pre-consume, but it is able to bring some portion of its pre-consumption back to the market at a later time.

The Platform Agents

Any of the Agents Personalities named above can in principal interact with any other agent through bilateral transactions. Some markets might be set up with all tenders going to a single entity who manages all transactions.

Broker

The Broker acts as an agent by executing public orders. It may operate a double auction. The Broker does not itself have a position in any trade. (Transactions to power the broker are an exception). In the home, a home router may act as a broker.

Market Maker

A Market Maker acts as a Broker by executing public orders left. It Market Maker further maintains an orderly resource market with a responsibility to buy for its own account in the absence of public buy orders, and sell from its own account in the absence of public sell orders. The market Maker personality may be associated with Storage or with external market sales and purchases. External market sales and purchases are not part of the internal maker that operates the microgrid.

How to use the Agents

Each of the simple agent personalities could characterize a single node or a collection of nodes. Microgrids can be characterized just as nodes are characterized. This point is fundamental to considering interactions within aggregations of microgrids, as to considering the dis-aggregation if a node into smaller component systems.

A system or device developer should select the personality that he desires to represent his technology.

A set of agents sufficient to support systems with each of these characteristics is able to support all systems potentially within a microgrid. Such a set does not rule out potential hybrid systems, in which two or more of these characteristics coexist within a single system—such a system is a natural outcome of a microgrid at one level being a node at a higher level.