nection between consumer and utilities will be maintained through secure links at high speed. Consumers will receive real time updates for price and energy and can thus control their energy consumption concurrently rather than having to wait for monthly updates from power companies. Utilities are already investing greatly in Smart Meters and Advanced Metering Infrastructure (AMI) as the first step to secure the prospect of two-way communication between the home and utility company [4].

• An Automated System: In addition to contributing to reliable and secure electricity and information, Smart Grids open up an array of possibilities for utilities and consumers. Distributed Generation (DG) at a residential level including micro turbines, solar photovoltaic cells, wind turbines and grid energy storage enable increased bi-directional power flow between power distributors and end-users. A smarter grid will add resiliency to our electric power system and make it better prepared to address emergencies such as severe storms, earthquakes, terrorist attacks and blackouts. The interactive nature of the Smart Grid will allow for automatic rerouting of information when the equipment fails. This will help minimize outages when they do happen.

• Communications Framework: Fiber optics, microwave, infrared, power line carriers (PLC), wireless radio carriers such as GSM and CDMA [4], transfer massive amounts of data. Together they make up the network most communication is built on. Wireless communication will enable connections between devices, homes and utilities and information will be sent so all data may be received and managed on a real time basis. By establishing a constant requirement for communication between homes and utilities, security of information can be preserved and constantly improved.

• Increased Grid Visibility: A key component of distribution intelligence is outage detection and response. Today, outages are detected based on customer phone calls from an area. Superior automation technology with the help of smart meters will enable grid operators to detect outages as instantly as power is lost. Operators can thus isolate a sector facing a power outage and send technicians to immediately fix the problem area. Another feature of this automation technology allows for newer and well-developed visualization techniques that interpret large amounts of data into information that can be easily understood by the consumer.

Consumer Benefits from the Smart Grid: Smart Meters provide dynamic information that gives consumers real-time updates on energy consumption and management. Dynamic monitoring of household data gives consumers instant reach to information as opposed to having to wait for monthly statements to determine usage patterns. Customers may now actively participate in three [5] ways. (1) First, customers can reduce their consumption of electricity at peak hours. By reducing their electricity, the drop in demand may be able to ease some pressure off the grid. If this action results in a significant shift in pressure at peak hours, grid operators will notice lesser demand in power that will in turn reduce over all price of power at a peak hour. (2) Secondly, the customer may be able to shift heavy power consuming loads operating at peak hours to off-peak hours. While the same amount of power is demanded off the grid, the consumer may