

Low Voltage Customer Characterization Options for Distribution Pricing and Demand Side Management

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Distribution Network Pricing

- Regulated prices for distribution utilities based on capital & running cost
- Diversity of topologies & customer densities are difficult to account for
- Stumbling block for planning activity & pricing analysis
- Difficult to offer consistent cost evaluation/allocation for utilities performing in diverse conditions

Existing Customer Characterization

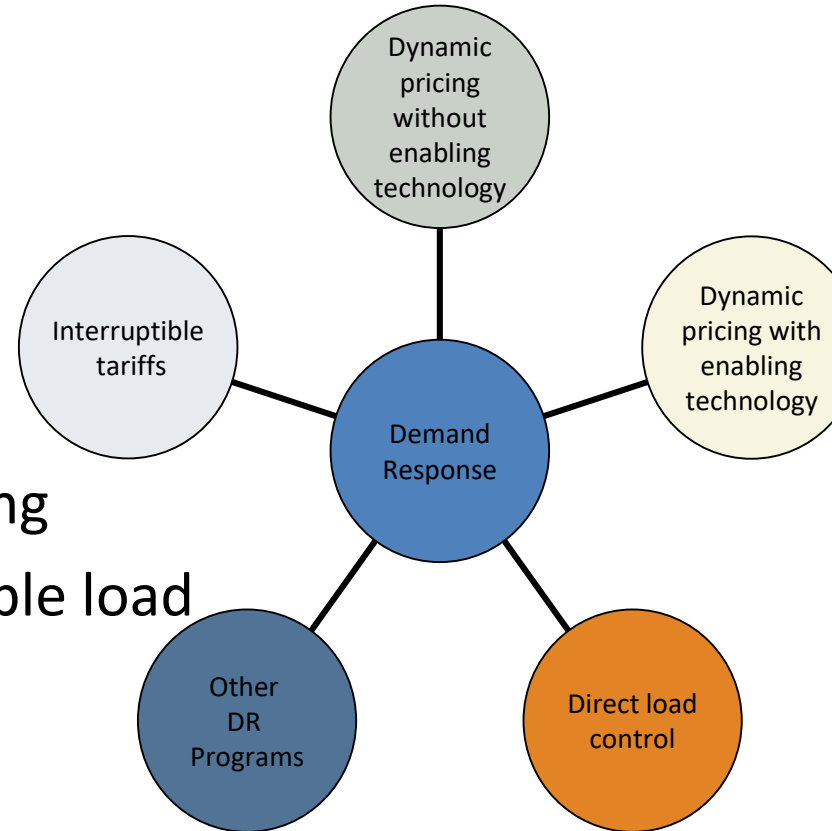
- Customer Type
- Customer Size
- Customer's Time of Use
- Supply System
 - Three Phase
 - Single Phase

Customer Characterization: International Practices

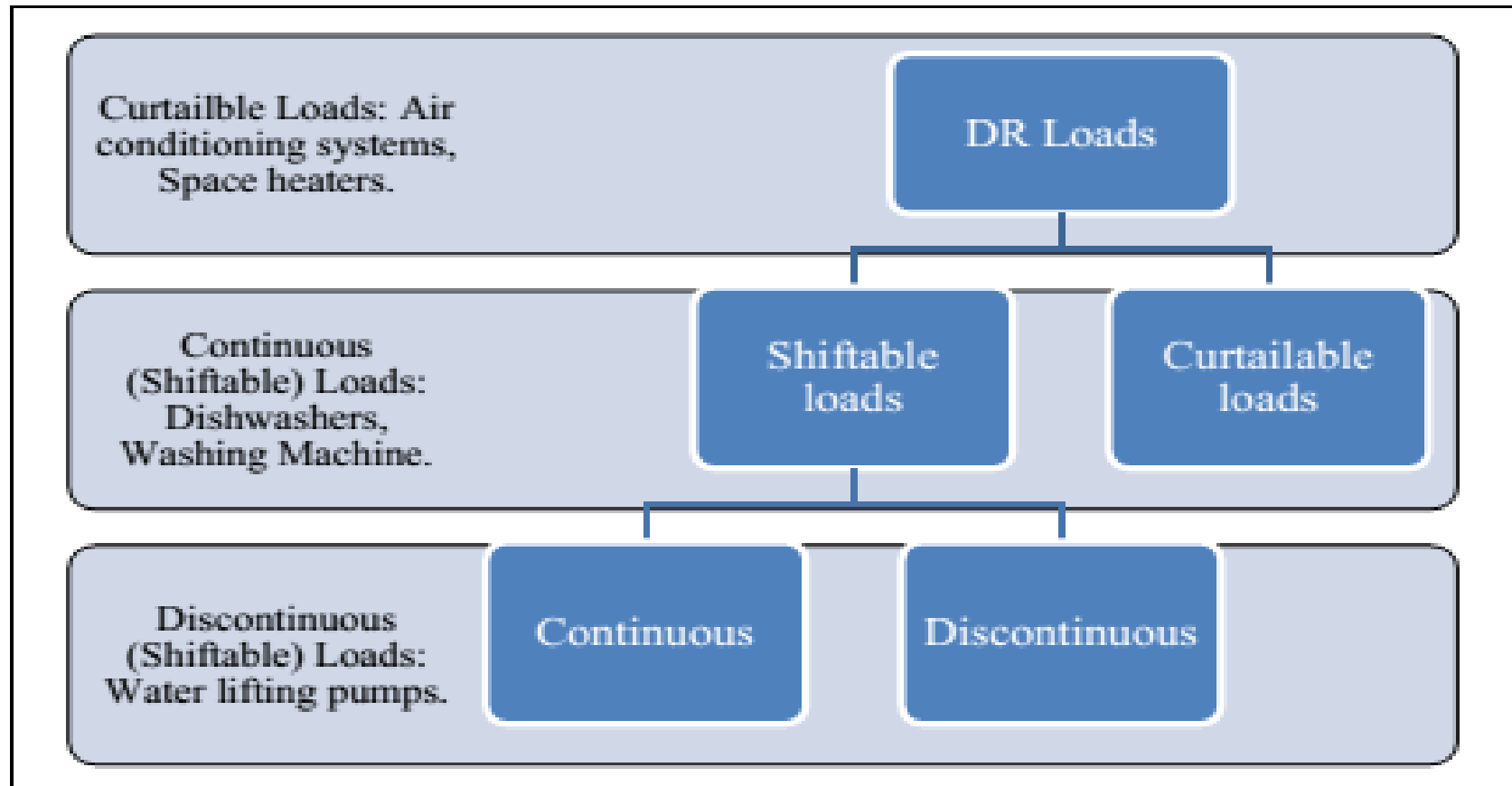
- Residential: Connected load/ Maximum demand based classification
- Commercial: Connected load / Maximum demand based classification
- Industrial: Connected load based classification
 - Small, medium, large
- Agricultural
 - Metered/flat rate
- Water works: Connected load / Maximum demand based classification
- Income based
 - Low, medium, high
- Geographical area
 - Urban and rural
- Others
 - Public street lighting, Mixed load, Unmetered supplies

Demand Side Management

- Providing reliable supply services
- Bridge energy supply-demand gap
- Voluntary response of customers
- Peak management
- Requires load pattern understanding
- Dispatchable load / Non dispatchable load
- Load curtailment



DR Programs – Load classification



Storage based DSM

- Customer end storage
- Sizing and siting dependent on requirement
- Asset for distribution system
- Offers flexibility in DSM
- Electrical vehicle/Rickshaw based load

DSM based Customer Characterization

- Consumer response depends on
 - Income
 - Requirement/necessity
 - Emergency
 - Weekday/weekend
 - Seasons: winter/summer
 - Day/Night
 - Incentives

DSM Based Characterization with high renewable penetration

- Consumers with renewables sources
- Consumers with energy storages
- Consumers with EV owner
- Specific load clusters are prone to load shifting

Impact of characterization on DNP

- Consumers respond to network prices
- Captive consumers
- Congestion – increase network price
- Participating consumers
 - Shiftable load
 - Curtailable/interruptible load
- Non-participating consumers

Future Customer Characterization

- Curtailable load / Non-curtailable load
- Consumers / Prosumers
- Storage / Non-storage consumer
- Demand Response based
 - Price Responsive, Non-price responsive
- Consumption uncertainty
- Quantum of connected load points

Network and market driven DSM

- Market-driven DSM
 - Primarily aims cost minimization
 - Reduces energy demand, mainly to times when prices are lower
- Network-driven DSM
 - Can delay the need for network expansion
 - Provide short-term responses to energy market volatility