Modeling Framework for Network Planning

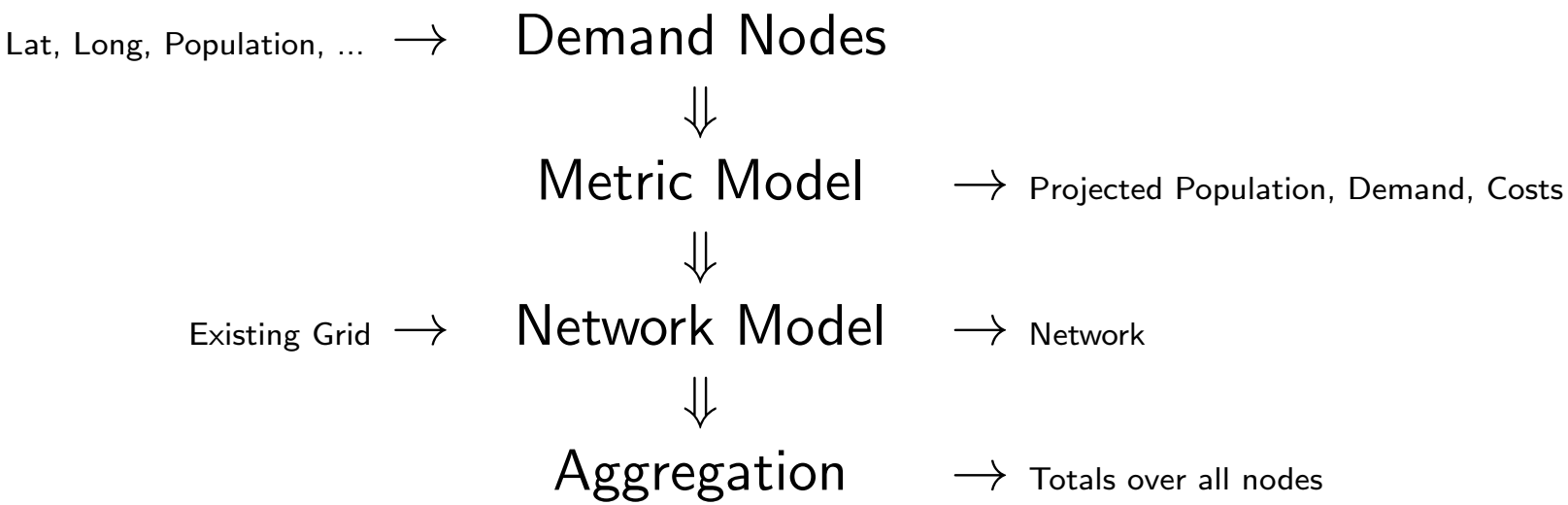
(Demand Nodes, Parameters)

$\Downarrow$

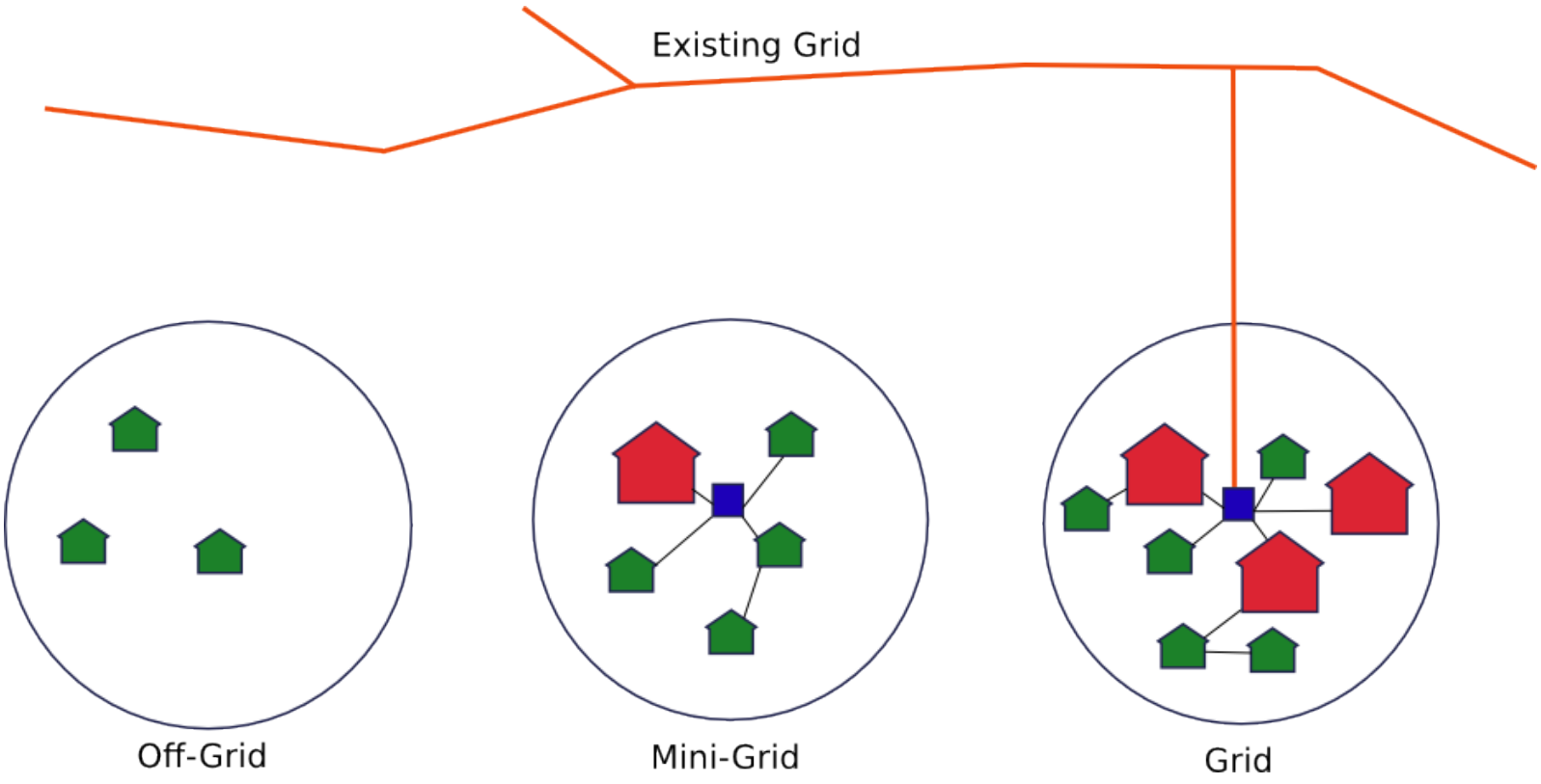
NP

$\Downarrow$

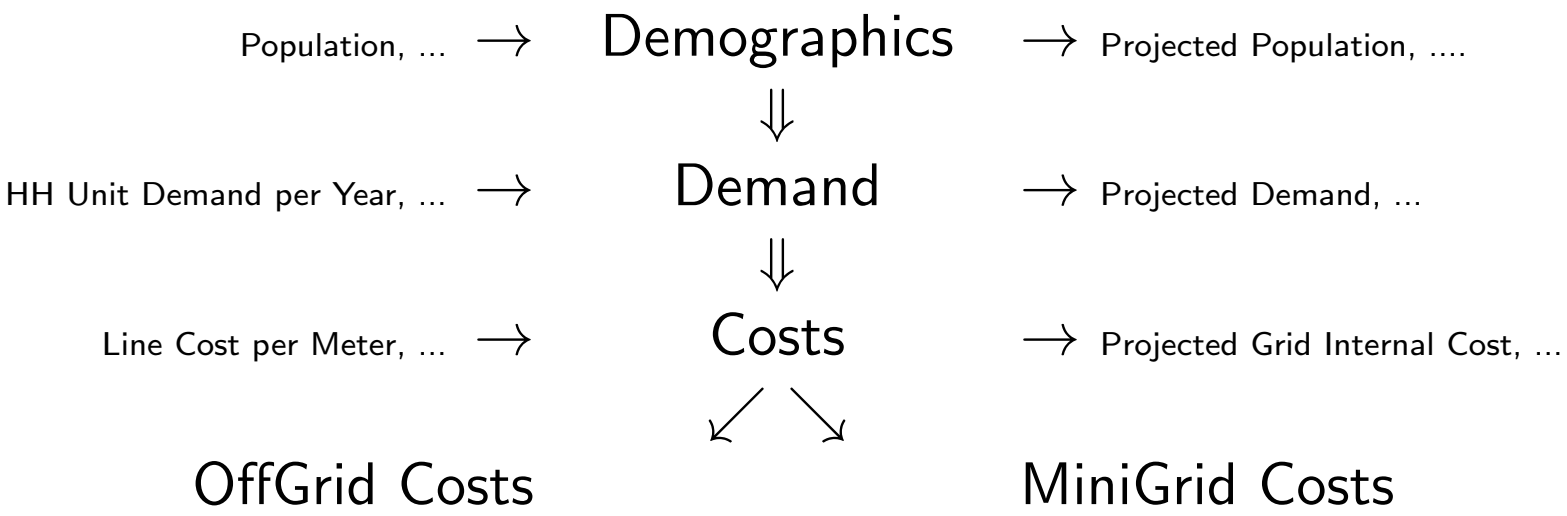
(Network, Model Outputs)


Lat, Long, Population, ...
Demand Nodes
Metric Model
Projected Population, Demand, Costs
Existing Grid
Network Model
Network
Aggregation
Totals over all nodes

Electrification Options



Metric Model



$$mvMax = \frac{min(OffGridCost, MiniGridCost) - GridInternalCost}{mvCostPerMeter}$$

Network Model

Kruskal's MST Algorithm

Iterate over all candidate segments (node pairs) in ascending length order adding to the network IF they do not create a cycle.

Modifications:

1. Add the condition $node1.mvMax \geq segment.length \wedge node2.mvMax \geq segment.length$
2. Use "intersects subnet in more than 1 place" for cycle detection
3. For segments added and all nodes in their subnet, set

   $mvMax = node1.mvMax + node2.mvMax - segment.length$

That last modification "distributes" demand over the network, increasing it's reach