# pyCIMS demand- supply equilibrium process

1. Explore each branch of the tree to determine energy demand
   1. Energy demand at each child node depends on the end use supply of the parent node
2. Energy demand can either be summed by:
   1. Compiling a set of equations with symbolic representation of the variables used in the market share equations, with all equations solved at the end and demand summed up; or
   2. Using initial conditions for some variables to determine approximate demand and each node added to the total sum as the tree is explored
3. Each sector has the net demand for each fuel summed
   1. Some sectors have technologies the produce end uses (like electricity) in addition to other end uses (like heat), which can reduce the net fuels that the supply-side needs to provide. So net demand needs to be determined sector by sector.
4. Send the total demand for each fuel to the supply-side nodes
   1. The supply tree operates the same as the demand-side: explore each branch of the tree, determine supply technology market shares (either through system of equations or temporary initial conditions)
   2. Once market shares are determined, find the weighted-average price for each fuel based on the technologies used
5. Compare the prices determined on the supply-side to the prices used for demand-side calculations. If any of the prices differ more than a threshold value (e.g. by more than 5%) then reiterate the above process using the new fuel prices.
   1. May need to have limits to iterations since some small fuels may never reach equilibrium

The workflow above is based on the theory that supply and demand will converge over iterations (i.e. supply increases with higher prices, while demand decreases with higher prices).