

Graph-theoretic Model for Observability in Multi-carrier Energy Distribution Networks

Steady state modeling as a graph $M = (V, A)$

- V : set of vertices
- $V_i \subseteq V$: set of transfer vertices of carrier $i \in [1, k]$
- $V_C \subseteq V$: set of converters (e.g. CHP, P2X)
- $V_T \subseteq V$ set of disturbances
- $A \subseteq \binom{V}{2}$: set of edges

Vertices and edges are related to *effort* and *flow variables*:

	Electricity	Natural Gas	Heat
effort e	voltage U	pressure p	pressure p
flow f	current I	flow Q	flow Q

