**CS229 Project – H2 supply chain & ML**

**Set of constraints**

**Battery**

1. Charge/discharge rate limitations

Variables:

* : Charge (<0) / Discharge(>0) rate of the battery [kW]

Parameters:

* : max discharge rate of the battery (>0) [kW]
* : max charge rate of the battery (<0) [kW]

1. Storage capacity

With &

Variables:

* : Energy in the battery [kWh]

Parameters:

* : Nominal capacity of the battery [kWh]
* : Max load coefficient []
* : Min load coefficient []

1. Load rate management

Variables:

Parameters:

* Maximum power rate [kW/hr]

1. Energy balance

Variables:

* : Energy in the battery [kWh]
* : Charge/discharge power [kW]
* Losses from the battery at each time step [kW] **TBD**

Parameters:

* : Duration of one time step [hrs]

OR

during charge (

during discharge

Variables:

* : Energy in the battery [kWh]
* Charge/discharge power [kW]

Parameters:

* : Duration of one time step [hrs]
* Efficiency of the battery []

**Pressure vessel**

1. Charge/discharge rate limitations

Variables:

* : Charge (<0) / Discharge(>0) Hydrogen flow [kg(H2)/hr]

Parameters:

* : max hydrogen flow out of vessel (>0) [kg(H2)/hr]
* : max hydrogen flow in vessel (<0) [kg(H2)/hr]

1. Storage capacity

With

Variables:

* : Hydrogen in the vessel [kg(H2)]

Parameters:

* : Nominal H2 capacity of the vessel [kg(H2) ]
* : Max load coefficient []
* : Min load coefficient []

1. Hydrogen balance

With

Variables:

* : Energy in the battery [kg(H2)]
* : Charge/discharge power [kg(H2)/hr]
* self-hydrogen consumption to run the H2 compressors

Parameters:

* : Duration of one time step [hr]
* : Pressure of the H2 exiting the electrolyzer [bar]
* : Pressure of the H2 in storage vessels [bar]
* : Hydrogen temperature [K]
* : Ideal-gas constant [TBD]
* : Power to Hydrogen conversion efficiency [kWh/kg(H2)]

**Electrolyzer**

1. Load limitations

Variables:

* : Charge (<0) / Discharge(>0) Hydrogen flow [kg(H2)/hr]

Parameters:

* : max hydrogen flow out of vessel (>0) [kW]
* : max hydrogen flow in vessel (<0) [kW]

1. Energy balance

Variables:

* Hydrogen production rate [kg(H2)/hr]
* : Power consumption [kW]

Parameters:

* Power to Hydrogen conversion efficiency [kWh/kg(H2)]
* duration of one time-step [hr]

1. Production rate management

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Variables:

* Revenue: variable to optimize on
* power consumption [kW]

Parameters:

* fake cost associated with dynamic management of production [$/(kw/hr)]