P38: +!run_nacelle2 : moving_blades_2 ← !run_gearbox_2; turns_shaft_2;...

P39: +!run_nacelle_3 : moving_blades_3 ← !run_gearbox_3; turns_shaft_3;...

P40: +!run_gearbox_1 : turning_shaft_1 ← !run_generator_1; increase_rotation_speed_1;...

P41: +!run_gearbox_2 : turning_shaft_2 ← !run_generator_1; increase_rotation_speed_2;...

P42: +!run_gearbox_3 : turning_shaft_3 ← !run_generator_3; increase_rotation_speed_3;...

P43: +!run_generator_1 : increased_rotation_speed_1 ← convert_rotational_power_1; supply_grid;...

P44: +!run_generator_2 : increased_rotation_speed_2 ← convert_rotational_power_2; supply_grid;...

P45: +!run_generator_2 : increased_rotation_speed_2 ← convert_rotational_power_2; supply_grid;...

P46: +wind_speed(l) : not supplying_grid ←

!stop_wind_mill_1; !stop_wind_mill_2, !stop_wind_mill_3; !run_solar_park; !run_battery_storage;...

P47: +fault_blade_1: wind_speed(h) & wind_direction(h) ← !stop_wind_mill_1; rotate_tower_head_2; rotate_tower_head_3;...

Agent: House

Assume the house is a grid-connected residential solar PV system that consists of a solar panel, an inverter and a meter (measuring electric power production and consumption). Sensors will measure temperature, voltage and frequency.

P48: +!prepare_to_start_house_ : true ← calibrate_inverter; calibrate_meter; !start_house;...

P49: +!start_house : not supplying_grid & calibrated_inverter & calibrated_meter ← !run_solar_panel_1;...

P50: +!run_solar_panel_1 : temp(n) ← collect_protons; !run_inverter; ...

P51: +!run_inverter: temp(n) & freq(n) & volt(n) & collecting_protons ← convert_power; !run_meter;...

P52: +!run_meter: temp(n) & freq(n) & volt(n) & converting_power ← measure_usage; use_appliance;...

P53: +fault_meter : not measuring_usage ← !generate_alert;...

P54: +volt(h) : collecting_protons & converting_power & using_appliance ← supply_grid;...

P55: +volt(l) : collecting_protons & converting_power & not using_appliance ← obtain_power_from_grid,...

P56: +fault_inverter : collecting_protons & not converting_power ← !generate_alert; !stop_inverter; obtain_power_from_grid;...

P57: +!stop_inverter : ← temp(h) & not converting_power & not supplying_grid ← !maintain_inverter;...

P58: +generate_alert : not measuring usage | not converting_power ← send_message_home_owner; flash_light_on_meter; send_message_utility;...

P59: +maintain_inverter : temp(h) & stopped_inverter ← replace_inverter; calibrate_inverter;...

Agent: Battery Storage Plant

Assume the battery storage plant consists of a storage device i.e. battery and bi-directional inverter. The battery storage plant relieves the grid when there is an oversupply of electric power and will supply electric power to the power grid when required to meet demand. Sensors will measure ambient temperature and depth of discharge (battery capacity).

P60: +!prepare_to_start_battery_storage : true ← calibrate_inverter; !start_battery_storage;...

P61: +!start_battery_storage : calibrated_battery & calibrated_inverter & ← !run_inverter;...

P62: +!run_inverter: temp(n) & oversupply_in_powergrid ← convert_power; !run_battery;...

P63: +!run_battery : temp(n) & battery_capacity(n) & oversupply_in_grid & converting_power ← charge_battery_with_power;...

P64: +!run_battery : temp(n) & battery_capacity(n) & undersupply_in_powergrid ← !run_inverter; discharge_battery;...

P65: +!run_inverter: temp(n) & undersupply_in_grid & discharging_battery ← convert_power; !supply_grid;...

P66: +temp(h): not converting_power ← !generate_alert; stop_inverter;...