

# Appendix: Decision-Dependent Uncertainty-Aware Preventive-Corrective Strategy against Electrically Induced Wildfires

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## Nomenclature

### Sets

- $\mathcal{I}$  Set of buses in the system.
- $\mathcal{G}$  Set of generating units in the system.
- $\mathcal{L}$  Set of overhead power lines in the system.
- $\mathcal{T}$  Set of time periods in the decision-making horizon.
- $\mathcal{S}$  Set of scenarios.

### Parameters

- $a_g$  Operating cost of generating unit  $g$ .
- $b_g$  Fixed cost of generating unit  $g$  when it is online.
- $c_g^+, c_g^-$  Start-up/Shut-down cost of generating unit  $g$ .
- $c_i^{sh}$  Load shedding cost for bus  $i$ .
- $c_{l,s}^{wf}$  Wildfire cost due to the ignition on line  $l$  in scenario  $s$ .
- $\rho_s$  Probability of scenario  $s$ .
- $\tau_g^+, \tau_g^-$  Minimum up-/down-time of generating unit  $g$ .
- $R_g^+, R_g^-$  Ramp-up/-down rate of generating unit  $g$ .
- $\hat{R}_g^+, \hat{R}_g^-$  Start-up/-down limit of generating unit  $g$ .
- $\tilde{R}_g^+$  Maximum sustained ramp rate of generating unit  $g$ .
- $\tilde{R}_g^-$  Maximum quick start capacity of generating unit  $g$ .
- $P_g^{gen}, \bar{P}_g^{gen}$  Minimum/Maximum capacity of generating unit  $g$ .
- $\delta$  Ratio for reserve requirement.
- $P_{i,t}^{de}$  Power demand of bus  $i$ , at time  $t$ .
- $\sigma_{i,g}$  Binary parameter equal to 1 if generating unit  $g$  is connected to bus  $i$ .
- $B_l$  Susceptance of line  $l$ .
- $U$  Big-M value.
- $\underline{\theta}_i, \bar{\theta}_i$  Minimum/Maximum values of voltage angle of bus  $i$ .
- $F_{l,t}^{dlr}$  Dynamic line rating (DLR) capacity of line  $l$  at time  $t$ .
- $\beta_{l,t,s}^L, \beta_{l,t,s}^M, \beta_{l,t,s}^H$  Binary parameter equal to 1 if wind gust is in low/medium/high level near line  $l$  at time  $t$  in scenario  $s$ .

*Variables*

$x_{l,t}$	Binary variable equal to 1 if overhead line $l$ is shutoff intentionally at time $t$ .
$u_{g,t}$	Binary variable equal to 1 if generating unit $g$ is online at time $t$ .
$u_{g,t}^+, u_{g,t}^-$	Binary variable equal to 1 if generating unit $g$ starts up/shuts down at time $t$ .
$p_{g,t,s}^{gen}$	Power output of generating unit $g$ at time $t$ in scenarios $s$ .
$p_{i,t,s}^{sh}$	Load shedding on bus $i$ at time $t$ in scenario $s$ .
$r_{g,t,s}^{sp}$	Spinning reserve of generating unit $g$ at time $t$ in scenario $s$ .
$r_{g,t,s}^{Nsp}$	Total non-spinning reserve of generating unit $g$ at time $t$ in scenario $s$ .
$n_{h,t,s}^+, n_{h,t,s}^-$	Non-spinning reserve of generating unit $g$ when it is online/offline at time $t$ in scenario $s$ .
$\theta_{i,t,s}$	Voltage angle of bus $i$ at time $t$ in scenario $s$ .
$f_{l,t,s}$	Power flow on overhead power line $l$ at time $t$ in scenario $s$ .