

Supplement Document

I. GENERAL PARAMETERS SETTING

A. Technical parameters of FSP

The technical parameters of DG, ESS, and LA are summarized in Table I~III.

TABLE I: Technical Parameters of DG

Parameter	Value	Parameter	Value
$p_n^{g,max}$ (MW)	0.8	$p_n^{g,min}$ (MW)	0
$q_n^{g,max}$ (MVar)	0.6	$q_n^{g,min}$ (MVar)	-0.4
p_n^{rd} (MW/h)	0.6	p_n^{ru} (MW/h)	0.6
$\alpha_{n,t}^{g+}$ (€/MWh)	70	$\alpha_{n,t}^{g-}$ (€/MWh)	40

TABLE II: Technical Parameters of ESS

Parameter	Value	Parameter	Value
$p_n^{ec,max}$ (MW)	0.4	$p_n^{ed,max}$ (MW)	0.4
e_n^e (MWh)	0.1	η_n^{ec}, η_n^{ed}	0.9
$e_n^{e,min}$ (MWh)	0.1	$e_n^{e,max}$ (MWh)	1.2
$\alpha_{n,t}^{e+}$ (€/MWh)	40	$\alpha_{n,t}^{e-}$ (€/MWh)	40

TABLE III: Technical Parameters of LA

Parameter	Value	Parameter	Value
$\beta_{n,t}^{d+}$	0.15	$\beta_{n,t}^{d-}$	0.15
$\beta_n^{d,min}$	0.9	$\beta_n^{d,max}$	1.1
$\alpha_{n,t}^{d+}$ (€/MWh)	60	$\alpha_{n,t}^{d-}$ (€/MWh)	120

II. PARAMETERS SETTING OF MODIFIED IEEE-15 DN

The system parameters of the modified IEEE 15-bus DN adopted in this paper are primarily derived from [1]. The schematic diagram of the modified IEEE 15-bus DN integrated with three DGs is shown in Fig.1. The DGs installed at Buses 4, 6, and 13 are labeled as DG1, DG2, and DG3, respectively.

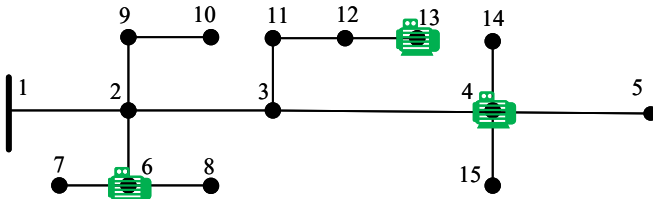


Fig. 1: A modified IEEE 15-bus DN integrated with three DGs

III. PARAMETERS SETTING OF MODIFIED IEEE-118 DN

The system parameters of the modified IEEE 118-bus distribution system adopted in this paper are primarily derived from [2]. The schematic diagram of the modified IEEE 118-bus

DN integrated with DGs is shown in Fig.2. It is assumed that each of the 22 buses in the system is equipped with an 80kW photovoltaic (PV) unit. The system comprises seven FSPs, including three DGs, two ESSs, and two LAs, as illustrated in Fig.2. The FSPs are labeled as follows: the DGs located at Buses 49, 72, and 112 are denoted as FSP1, FSP2, and FSP3, respectively; the ESSs at Buses 23 and 93 are denoted as FSP4 and FSP5; and the LAs at Buses 76 and 105 are labeled as FSP6 and FSP7.

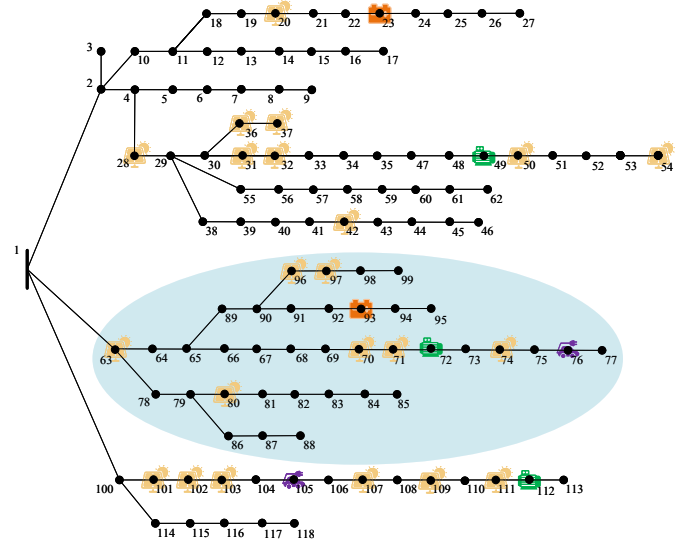


Fig. 2: A modified IEEE 118-bus DN integrated with seven FSPs

REFERENCES

- [1] D. Das, D. Kothari, and A. Kalam, "Simple and efficient method for load flow solution of radial distribution networks," *Int. J. Electr. Power Energy Syst.*, vol. 17, no. 5, pp. 335–346, 1995.
- [2] D. Zhang, Z. Fu, and L. Zhang, "An improved ts algorithm for loss-minimum reconfiguration in large-scale distribution systems," *Electr. Power Syst. Res.*, vol. 77, no. 5-6, pp. 685–694, 2007.