Appendix

Table 1 Planning schemes of DS with different cases in the 33-node system

DI :	G	Capacity of					Type	of lines				
Planning year	Case	substation (MW)	Line-1	Line-2	Line-3	Line-4	Line-5	Line-6	Line-7	Line-8	Line-9	Line-10
	Case-1	10.09	8	7	5	5	5	2	2	2	2	2
1	Case-2	8.65	4	4	3	3	2	1	1	1	1	1
	Case-3	8.53	4	4	3	3	2	1	1	1	1	1
	Case-1	1.01	9	-	6	6	6	3	-	-	-	-
2	Case-2	0.84	5	-	-	-	3	-	-	-	-	-
	Case-3	0.85	5	-	-	-	3	-	-	-	-	-
	Case-1	1.11	-	9	7	-	-	-	3	-	-	-
3	Case-2	0.95	6	5	-	-	-	2	-	-	-	-
	Case-3	0.94	6	5	-	-	-	2	-	-	-	-
	Case-1	1.22	-	-	-	7	7	-	-	3	-	-
4	Case-2	1.04	-	6	4	-	-	-	-	-	-	-
	Case-3	1.03	-	6	4	-	-	-	-	-	-	-
	Case-1	1.34	-	-	-	-	-	4	-	-	3	-
5	Case-2	1.15	7	-	-	4	4	-	2	-	-	-
	Case-3	1.14	7	-	-	4	4	-	2	-	-	-
Planning year	Case	line-11	line-12	line-13	line-14	line-15	line-16	line-17	line-18	line-19	line-20	line-21
	Case-1	1	1	1	1	1	1	1	1	1	1	1
1	Case-2	1	1	1	1	1	1	1	1	1	1	1
	Case-3	1	1	1	1	1	1	1	1	1	1	1
	Case-1	2	-	-	-	-	-	-	-	-	-	-
2	Case-2	-	-	-	-	-	-	-	-	-	-	-
	Case-3	-	-	-	-	-	-	-	-	-	-	-
	Case-1	-	-	-	-	-	-	-	-	-	-	-
3	Case-2	-	-	-	-	-	-	-	-	-	-	-
	Case-3	-	-	-	-	-	-	-	-	-	-	-
	Case-1	-	2	-	-	-	-	-	2	-	-	-
4	Case-2	-	-	-	-	-	-	-	-	-	-	-
	Case-3	-	-	-	-	-	-	-	-	-	-	-
	Case-1	-	-	-	-	-	-	-	-	-	-	-
5	Case-2	-	-	-	-	-	-	-	-	-	-	-
	Case-3	-	-	-	-	-	-	-	-	-	-	-
Planning year	Case	line-22	line-23	line-24	line-25	line-26	line-27	line-28	line-29	line-30	line-31	line-32
	Case-1	1	1	1	2	2	1	1	1	1	1	1
1	Case-2	1	1	1	1	1	1	1	1	1	1	1
	Case-3	1	1	1	1	1	1	1	1	1	1	1
	Case-1	-	-	-	-	-	2	-	-	-	-	-
2	Case-2	-	-	-	-	-	-	-	-	-	-	-
	Case-3	-	-	-	-	-	-	-	-	-	-	-
	Case-1	2	-	-	-	-	-	2	-	-	-	-
3	Case-2	-	-	-	-	-	-	-	-	-	-	-
	Case-3	-	-	-	-	-	-	-	-	-	-	-
	Case-1	-	-	-	-	-	-	-	-	-	-	-
4	Case-2	-	-	-	-	-	-	-	-	-	-	-
	Case-3	-	-	-	-	-	-	-	-	-	-	-
5	Case-1	-	-	-	3	-	-	-	-	-	-	-

Case-2	2	-	-	2	-	-	-	-	-	-	-
Case-3	2	-	-	2	-	-	-	-	-	-	-

*The symbol "-" means that the line is not invested.

Table 2 Planning scheme	s of FS with	n different cases i	in the 33-node system
Table 2 I failing scheme	S OI LO WIU	i uniterent cases i	in the 33-note system

Plannin	ng year		1			2			3			4			5	
Ca	ise	Case-														
Consoity	ACC (MW)	\	3.34	4.54	\	0.33	0.45	\	0.37	0.50	\	0.40	0.55	\	0.45	0.60
Capacity	CST (MW·h)	\	25.24	25.24	\	2.52	2.52	\	2.78	2.78	\	3.05	3.05	\	3.36	3.36

Table 3 Planning schemes of DS with different cases in the 99-node system

Di	<u> </u>	Capacity of					Type	of lines				
Planning year	Case	substation (MW)	Line-1	Line-2	Line-3	Line-4	Line-5	Line-6	Line-7	Line-8	Line-9	Line-10
	Case-1	17.23	9	1	1	1	1	1	1	1	1	1
1	Case-2	14.5	4	1	1	1	1	1	1	1	1	1
	Case-3	14.32	4	1	1	1	1	1	1	1	1	1
	Case-1	1.72	-	-	-	-	-	-	-	-	-	-
2	Case-2	1.45	-	-	-	-	-	-	-	-	-	-
	Case-3	1.24	-	-	-	-	-	-	-	-	-	-
	Case-1	1.9	-	-	-	-	-	-	-	-	-	-
3	Case-2	1.6	5	-	-	-	-	-	-	-	-	-
	Case-3	1.57	5	-	-	-	-	-	-	-	-	-
	Case-1	2.08	-	-	-	-	-	-	-	-	-	-
4	Case-2	1.77	6	-	-	-	-	-	-	-	-	-
	Case-3	1.55	6	-	-	-	-	-	-	-	-	-
	Case-1	2.29	-	-	-	-	-	-	-	-	-	-
5	Case-2	1.63	-	-	-	-	-	-	-	-	-	-
	Case-3	1.89	-	-	-	-	-	-	-	-	-	-
Planning year	Case	line-11	line-12	line-13	line-14	line-15	line-16	line-17	line-18	line-19	line-20	line-21
	Case-1	9	1	9	1	8	2	1	1	1	1	1
1	Case-2	3	1	3	1	3	1	1	1	1	1	1
	Case-3	3	1	3	1	3	1	1	1	1	1	1
	Case-1	-	-	-	-	9	3	-	-	-	-	-
2	Case-2	4	-	4	-	-	-	-	-	-	-	-
	Case-3	4	-	4	-	-	-	-	-	-	-	-
	Case-1	-	-	-	-	-	-	-	-	-	-	-
3	Case-2	-	-	-	-	4	-	-	-	-	-	-
	Case-3	-	-	-	-	4	-	-	-	-	-	-
	Case-1	-	-	-	-	-	-	-	-	-	-	-
4	Case-2	5	-	5	-	5	-	-	-	-	-	-
	Case-3	5	-	5	-	5	-	-	-	-	-	-
	Case-1	-	-	-	-	-	4	-	-	-	-	-
5	Case-2	6	-	-	-	-	-	-	-	-	-	-
	Case-3	6	-	-	-	-	-	-	-	-	-	-
Planning year	Case	line-22	line-23	line-24	line-25	line-26	line-27	line-28	line-29	line-30	line-31	line-32
	Case-1	1	1	6	1	1	1	1	5	1	1	1
1	Case-2	1	1	2	1	1	1	1	2	1	1	1
	Case-3	1	1	2	1	1	1	1	2	1	1	1
2	Case-1	-	-	-	-	-	-	-	6	-	-	-
2	Case-2	-	-	-	-	-	-	-	-	-	-	-

	Case-3	_	_	-	_	_	-	-	-	-	-	-
	Case-1	-	_	7	-	_	-	-	-	-	-	-
3	Case-2	-	_	3	_	_	_	_	_	_	_	_
	Case-3	-	_	3	_	_	_	_	_	_	_	_
	Case-1	_	_	_	_	_	_	_	7	_	_	_
4	Case-2	_	_	_	_	_	_	_	3	_	_	_
	Case-3	_	_	_	_	_	_	_	3	_	_	_
	Case-1	-	_	8	_	_	_	_	-	_	_	_
5	Case-2	-	_	-	_	_	_	_	_	_	_	_
	Case-3	-	_	_	_	_	_	_	_	_	_	_
Planning year	Case	line-33	line-34	line-35	line-36	line-37	line-38	line-39	line-40	line-41	line-42	line-43
	Case-1	1	1	1	1	3	3	3	1	3	2	1
1	Case-2	1	1	1	1	1	1	1	1	1	1	1
-	Case-3	1	1	1	1	1	1	1	1	1	1	1
	Case-1	-	-	-	-	-	_	-	-	-	3	-
2	Case-2	_	_	_	_	_	_	_	_	_	-	_
2	Case-3	_		_	_	_	_	_	_	_	_	_
	Case-1	_		_	_	_	_	_	_	_	_	_
3	Case-2	_		_	_	_	_	_	_	_	_	_
3	Case-3	_		_	_	_	_	_	_	_	_	_
	Case-1	_		_	_	4	4	4	_	4	_	_
4	Case-2	_		_	_	-	-	-	_	-	_	_
	Case-3	_		_	_	_	_	_	_	_	_	_
	Case-1	_		_	_	5	5	_	_	_	4	_
5	Case-2	_	_	_	_	2	2	2	_	_	-	_
3	Case-3			_	_	2	2	2	_	_	_	_
Planning year		- line-44	line-45	line-46	line-47				line-51	line-52	line-53	line-54
Planning year	Case	line-44	line-45	line-46	line-47	line-48	line-49	line-50	line-51	line-52	line-53	line-54
	Case Case-1	1	1	2	1	line-48	line-49	line-50	1	1	5	5
Planning year	Case-1 Case-2	1 1	1	2	1 1	line-48 1 1	line-49 1 1	line-50 1 1	1	1	5	5
	Case Case-1 Case-2 Case-3	1	1	2	1 1 1	line-48	line-49	line-50	1	1	5 3 3	5 3 3
1	Case-1 Case-2 Case-3 Case-1	1 1	1	2	1 1	line-48 1 1	line-49 1 1	line-50 1 1	1	1	5	5
	Case-1 Case-2 Case-3 Case-1 Case-2	1 1	1	2	1 1 1	line-48 1 1	line-49 1 1	line-50 1 1	1	1	5 3 3	5 3 3
1	Case-1 Case-2 Case-3 Case-1 Case-2 Case-3	1 1	1	2	1 1 1	line-48 1 1 1 - -	line-49 1 1 - -	line-50 1 1	1	1	5 3 3	5 3 3
2	Case-1 Case-2 Case-3 Case-1 Case-2 Case-3 Case-1	1 1	1	2	1 1 1	line-48 1 1	line-49 1 1	line-50 1 1	1	1	5 3 3 6 -	5 3 3 6 -
1	Case-1 Case-2 Case-3 Case-1 Case-2 Case-3 Case-1 Case-2	1 1	1	2	1 1 1	line-48 1 1 1 - -	line-49 1 1 - -	line-50 1 1	1	1	5 3 3 6 - - 4	5 3 3 6 - - 4
2	Case-1 Case-2 Case-3 Case-1 Case-2 Case-3 Case-1 Case-2 Case-3 Case-1 Case-2	1 1	1	2	1 1 1	line-48 1 1 1 - -	line-49 1 1 - -	line-50 1 1	1	1	5 3 3 6 - - 4 4	5 3 3 6 - - 4 4
2 3	Case-1 Case-2 Case-3 Case-1 Case-2 Case-3 Case-1 Case-2 Case-3 Case-1 Case-2	1 1	1	2	1 1 1	line-48 1 1 1 - -	line-49 1 1 - -	line-50 1 1	1	1	5 3 3 6 - - 4	5 3 3 6 - - 4
2	Case-1 Case-2 Case-3 Case-1 Case-2 Case-3 Case-1 Case-2 Case-3 Case-1 Case-2 Case-3 Case-1	1 1	1	2	1 1 1	line-48 1 1 1 - -	line-49 1 1 - -	line-50 1 1	1	1	5 3 3 6 - - 4 4	5 3 3 6 - - 4 4
2 3	Case-1 Case-2 Case-3 Case-1 Case-2 Case-3 Case-1 Case-2 Case-3 Case-1 Case-2 Case-3	1 1	1	2	1 1 1	line-48 1 1 1 - -	line-49 1 1 - -	line-50 1 1	1	1	5 3 3 6 - - 4 4	5 3 3 6 - - 4 4
1 2 3	Case Case-1 Case-2 Case-3 Case-1 Case-2 Case-3 Case-1 Case-2 Case-3 Case-1 Case-1 Case-2	1 1	1	2	1 1 1	line-48 1 1 1 - -	line-49 1 1 - -	line-50 1 1	1	1	5 3 3 6 - - 4 4 7 -	5 3 3 6 - - 4 4 4 7 -
2 3	Case-1 Case-2 Case-3	1 1	1	2	1 1 1	line-48 1 1 1 - -	line-49 1 1 - -	line-50 1 1	1	1	5 3 3 6 - - 4 4 7 - - 5	5 3 3 6 - - 4 4 7 - - 5
1 2 3 4	Case Case-1 Case-2 Case-3	1 1 1 - - - - - - -	1 1 1 - - - - - - -	2 1 1	1 1 2 - - - - - -	line-48 1 1 1 2	line-49 1 1 - - 2 - - - - - - - - - -	line-50 1 1 - - - - - - - - - - -	1 1 1 - - - - - -	1 1 1 - - - - - -	5 3 3 6 - - 4 4 7 - - 5 5	5 3 3 6 - - 4 4 7 - - 5 5
1 2 3	Case Case-1 Case-2 Case-3 Case-1 Case-2	1 1 1	1 1 1	2 1 1 - - - - - - - - - - - - - - - - -	1 1 2 - - - - - - - - - - - - - - - - -	line-48 1 1 - - 2 - - - - - - - - - -	line-49 1 1 - - 2 - - - - - - - - - -	line-50 1 1 - - - - - - - - - - -	1 1 1	1 1 1 - - - - - - - - - - - - - - - - -	5 3 3 6 4 4 7 - 5 5 Iline-64	5 3 3 6 - - 4 4 7 - - 5 5
2 3 4 5 Planning year	Case Case-1 Case-2 Case-3	1 1 1 1 line-55	1 1 1 1 ine-56	2 1 1 - - - - - - - - - - 1 - - - 4	1 1 2 1line-58	line-48 1 1 1 2	line-49 1 1 - - 2 - - - - - line-60	line-50 1 1 1 line-61	1 1 1 4	1 1 1 1 line-63	5 3 3 6 4 4 7 - 5 5 line-64	5 3 3 6 4 4 7 - 5 5 line-65
1 2 3 4	Case Case-1 Case-2 Case-3	1 1 1 1 1ine-55	1 1 1 1ine-56 4 3	2 1 1 3	1 1 1 2 1ine-58	line-48 1 1 1 2 line-59 4 3	line-49 1 1 1 2 line-60	line-50 1 1 1 line-61	1 1 1	1 1 1 1ine-63	5 3 3 6 4 4 7 - 5 5 5 line-64 3 2	5 3 3 6 4 4 7 - 5 5 5 line-65
2 3 4 5 Planning year	Case Case-1 Case-2 Case-3 Case-1	1 1 1 1 line-55	1 1 1 1ine-56 4 3 3	2 1 1	1 1 2 1line-58	line-48 1 1 1 2 1ine-59 4 3 3	line-49 1 1 - - 2 - - - - - line-60	line-50 1 1 1 line-61	1 1 1 4	1 1 1 1 1 1 1 1	5 3 3 6 4 4 7 - 5 5 line-64 3 2 2	5 3 3 6 4 4 7 - 5 5 line-65
1 2 3 4 5 Planning year 1	Case Case-1 Case-2 Case-3 Case-1 Case-1 Case-2 Case-3 Case-1 Case-1	1 1 1 1 1ine-55	1 1 1 1ine-56 4 3	2 1 1 3	1 1 1 2 1ine-58	line-48 1 1 1 2 line-59 4 3	line-49 1 1 1 2 line-60	line-50 1 1 1 line-61	1 1 1 2 Line-62	1 1 1 1 1 line-63 1 1	5 3 3 6 4 4 7 - 5 5 line-64 3 2 4	5 3 3 6 4 4 7 - 5 5 5 line-65
2 3 4 5 Planning year	Case Case-1 Case-2 Case-3	1 1 1 1 1ine-55	1 1 1 1ine-56 4 3 3	2 1 1	1 1 1 2 1ine-58	line-48 1 1 1 2 1ine-59 4 3 3	line-49 1 1 1 2 line-60	line-50 1 1 1 line-61	1 1 1	1 1 1 1 1 1 1 1	5 3 3 6 4 4 7 - 5 5 5 line-64 3 2 4 3	5 3 3 6 4 4 7 - 5 5 5 line-65
2 3 4 5 Planning year	Case Case-1 Case-2 Case-3 Case-1 Case-1 Case-2 Case-3 Case-1 Case-1	1 1 1 1 1ine-55	1 1 1 1ine-56 4 3 3	2 1 1	1 1 1 2 1ine-58	line-48 1 1 1 2 1ine-59 4 3 3	line-49 1 1 1 2 line-60	line-50 1 1 1 line-61	1 1 1 2 Line-62	1 1 1 1 1 line-63 1 1	5 3 3 6 4 4 7 - 5 5 line-64 3 2 4	5 3 3 6 4 4 7 - 5 5 5 line-65

	Case-2	-	-	-	-	-	-	-	-	-	-	-
	Case-3	-	-	-	-	-	-	-	-	-	-	-
	Case-1	-	-	-	-	6	-	-	-	-	5	-
4	Case-2	-	4	4	-	4	-	-	-	-	-	-
	Case-3	-	4	4	-	4	-	-	-	-	-	-
	Case-1	-	7	7	-	7	-	-	6	-	6	-
5	Case-2	-	5	5	-	-	-	-	4	-	-	-
	Case-3	-	5	5	-	-	-	-	4	-	-	-
Planning year	Case	line-66	line-67	line-68	line-69	line-70	line-71	line-72	line-73	line-74	line-75	line-76
	Case-1	3	1	1	1	1	3	1	2	1	2	1
1	Case-2	2	1	1	1	1	2	1	2	1	2	1
	Case-3	2	1	1	1	1	2	1	2	1	2	1
	Case-1	4	-	-	-	-	-	-	3	-	3	-
2	Case-2	3	-	-	-	-	-	-	-	-	-	-
	Case-3	3	-	-	-	-	-	-	-	-	-	-
	Case-1	-	-	-	-	-	-	-	-	-	-	-
3	Case-2	-	-	-	-	-	-	-	-	-	-	-
	Case-3	-	-	-	-	-	-	-	-	-	-	-
	Case-1	5	-	-	-	-	4	-	-	-	-	-
4	Case-2	-	-	-	-	-	3	-	-	-	-	-
	Case-3	-	-	-	-	-	3	-	-	-	-	-
	Case-1	-	-	-	-	-	5	-	4	-	4	-
5	Case-2	-	-	-	-	-	-	-	3	-	-	-
	Case-3	-	-	-	-	-	-	-	3	-	-	-
Planning year	Case	line-77	line-78	line-79	line-80	line-81	line-82	line-83	line-84	line-85	line-86	line-87
	Case-1	2	1	1	1	1	1	1	1	1	1	1
1	Case-2	1	1	1	1	1	1	1	1	1	1	1
	Case-3	1	1	1	1	1	1	1	1	1	1	1
	Case-1	-	-	-	-	-	-	-	-	-	-	-
2	Case-2	-	-	-	-	-	-	-	-	-	-	-
	Case-3	-	-	-	-	-	-	-	-	-	-	-
	Case-1	-	-	-	-	-	-	-	-	-	-	-
3	Case-2	-	-	-	-	-	-	-	-	-	-	-
	Case-3	-	-	-	-	-	-	-	-	-	-	-
	Case-1	-	-	-	-	-	-	-	-	-	-	-
4	Case-2	2	-	-	-	-	-	-	-	-	-	-
	Case-3	2	-	-	-	-	-	-	-	-	-	-
	Case-1	3	-	-	-	-	-	-	-	-	-	-
5	Case-2	-	-	-	-	-	-	-	-	-	-	-
	Case-3	-	-	-	-	-	-	-	-	-	-	-
Planning year	Case	line-88	line-89	line-90	line-91	line-92	line-93	line-94	line-95	line-96	line-97	line-98
	Case-1	1	1	1	1	1	1	1	1	1	1	1
1	Case-2	1	1	1	1	1	1	1	1	1	1	1
	Case-3	1	1	1	1	1	1	1	1	1	1	1
	Case-1	-	-	-	-	-	-	-	-	-	-	-
2	Case-2	-	-	-	-	-	-	-	-	-	-	-
	Case-3	-	-	-	-	-	-	-	-	-	-	-
	Case-1	-	-	-	-	-	-	-	-	-	-	-
3	Case-2	-	-	-	-	-	-	-	-	-	-	-
	Case-3	-	-	-	-	-	-	-	-	-	-	-

	Case-1	2	-	-	-	-	-	-	-	-	-	-
4	Case-2	-	-	-	-	-	-	-	-	-	-	-
	Case-3	-	-	-	-	-	-	-	-	-	-	-
	Case-1	-	-	-	-	-	-	-	-	-	-	-
5	Case-2	-	-	-	-	-	-	-	-	-	-	-
	Case-3	-	-	-	-	-	-	-	-	-	-	-

			Ta	able 4 Pl	anning s	chemes o	of ES wit	h differe	ent cases	in the 99	9-node sy	stem				
Plannir	ng year			2			3			4			5			
Ca	ise	Case-	Case-	Case-	Case-	Case-	Case-	Case-	Case-	Case-	Case-	Case-	Case-	Case-	Case-	Case-
Composity	ACC (MW)	\	6.14	8.15	\	0.61	2.83	\	0.67	0.90	\	0.75	0.99	\	0.81	1.08
Capacity	CST (MW·h)	\	40.25	39.52	\	4.03	3.22	\	4.44	4.35	\	4.89	4.78	\	5.14	5.26

Confidence level	Capacity of					Туре	of lines				
Confidence level	substation (MW)	Line-1	Line-2	Line-3	Line-4	Line-5	Line-6	Line-7	Line-8	Line-9	Line-10
90%	10.09	8	7	5	5	5	2	2	2	2	2
80%	9.91	8	7	5	5	5	2	2	2	2	2
70%	9.83	8	7	5	5	5	2	2	2	2	2
60%	9.78	8	7	5	5	5	2	2	2	2	1
50%	9.74	7	7	5	5	5	2	2	2	2	1
Confidence level	line-11	line-12	line-13	line-14	line-15	line-16	line-17	line-18	line-19	line-20	line-21
90%	1	1	1	1	1	1	1	1	1	1	1
80%	1	1	1	1	1	1	1	1	1	1	1
70%	1	1	1	1	1	1	1	1	1	1	1
60%	1	1	1	1	1	1	1	1	1	1	1
50%	1	1	1	1	1	1	1	1	1	1	1
Confidence level	line-22	line-23	line-24	line-25	line-26	line-27	line-28	line-29	line-30	line-31	line-32
90%	1	1	1	2	2	1	1	1	1	1	1
80%	1	1	1	2	2	1	1	1	1	1	1
70%	1	1	1	2	2	1	1	1	1	1	1
60%	1	1	1	2	2	1	1	1	1	1	1
50%	1	1	1	2	1	1	1	1	1	1	1

	Table 6 l	Planning so	chemes of I	OS with dif	ferent conf	idence leve	els in the 99	-node syste	em		
Cf: 11	Capacity of					Type	of lines				
Confidence level	substation (MW)	Line-1	Line-2	Line-3	Line-4	Line-5	Line-6	Line-7	Line-8	Line-9	Line-10
90%	17.23	9	1	1	1	1	1	1	1	1	1
80%	16.93	9	1	1	1	1	1	1	1	1	1
70%	16.79	9	1	1	1	1	1	1	1	1	1
60%	16.70	9	1	1	1	1	1	1	1	1	1
50%	16.64	9	1	1	1	1	1	1	1	1	1
Confidence level	line-11	line-12	line-13	line-14	line-15	line-16	line-17	line-18	line-19	line-20	line-21
90%	9	1	9	1	8	2	1	1	1	1	1
80%	9	1	9	1	8	2	1	1	1	1	1
70%	9	1	8	1	8	2	1	1	1	1	1
60%	9	1	8	1	8	2	1	1	1	1	1
50%	9	1	8	1	8	2	1	1	1	1	1
Confidence level	line-22	line-23	line-24	line-25	line-26	line-27	line-28	line-29	line-30	line-31	line-32

90%	1	1	6	1	1	1	1	5	1	1	1
80%	1	1	6	1	1	1	1	5	1	1	1
70%	1	1	6	1	1	1	1	5	1	1	1
60%	1	1	6	1	1	1	1	5	1	1	1
50%	1	1	5	1	1	1	1	5	1	1	1
Confidence level	line-33	line-34	line-35	line-36	line-37	line-38	line-39	line-40	line-41	line-42	line-43
90%	1	1	1	1	3	3	3	1	3	2	1
80%	1	1	1	1	3	3	3	1	3	2	1
70%	1	1	1	1	3	3	3	1	3	2	1
60%	1	1	1	1	3	3	3	1	3	2	1
50%	1	1	1	1	3	3	3	1	3	2	1
Confidence level	line-44	line-45	line-46	line-47	line-48	line-49	line-50	line-51	line-52	line-53	line-54
90%	1	1	2	1	1	1	1	1	1	5	5
80%	1	1	1	1	1	1	1	1	1	5	5
70%	1	1	1	1	1	1	1	1	1	5	5
60%	1	1	1	1	1	1	1	1	1	5	5
50%	1	1	1	1	1	1	1	1	1	5	5
Confidence level	line-55	line-56	line-57	line-58	line-59	line-60	line-61	line-62	line-63	line-64	line-6
90%	1	4	4	1	4	1	1	4	1	3	1
80%	1	4	4	1	4	1	1	3	1	3	1
70%	1	4	4	1	4	1	1	3	1	3	1
60%	1	4	4	1	4	1	1	3	1	3	1
50%	1	4	4	1	4	1	1	3	1	3	1
Confidence level	line-66	line-67	line-68	line-69	line-70	line-71	line-72	line-73	line-74	line-75	line-7
90%	3	1	1	1	1	3	1	2	1	2	1
80%	3	1	1	1	1	3	1	2	1	2	1
70%	3	1	1	1	1	3	1	2	1	2	1
60%	3	1	1	1	1	3	1	2	1	2	1
50%	3	1	1	1	1	3	1	2	1	2	1
Confidence level	line-77	line-78	line-79	line-80	line-81	line-82	line-83	line-84	line-85	line-86	line-8
90%	2	1	1	1	1	1	1	1	1	1	1
80%	2	1	1	1	1	1	1	1	1	1	1
70%	2	1	1	1	1	1	1	1	1	1	1
60%	2	1	1	1	1	1	1	1	1	1	1
50%	2	1	1	1	1	1	1	1	1	1	1
Confidence level	line-88	line-89	line-90	line-91	line-92	line-93	line-94	line-95	line-96	line-97	line-9
90%	1	1	1	1	1	1	1	1	1	1	1
80%	1	1	1	1	1	1	1	1	1	1	1
70%	1	1	1	1	1	1	1	1	1	1	1
60%	1	1	1	1	1	1	1	1	1	1	1
50%	1	1	1	1	1	1	1	1	1	1	1

Table 7 Planning schemes of different methods in the 33-node system

Method	Capacity of substation (MW)	Type of lines									
		Line-1	Line-2	Line-3	Line-4	Line-5	Line-6	Line-7	Line-8	Line-9	Line-10
P-DRO	10.09	8	7	5	5	5	2	2	2	2	2
D-DRO	9.06	7	6	5	4	4	2	2	2	2	1
SO	8.85	7	6	5	4	4	2	2	2	2	1
Method	line-11	line-12	line-13	line-14	line-15	line-16	line-17	line-18	line-19	line-20	line-21

P-DRO	1	1	1	1	1	1	1	1	1	1	1
D-DRO	1	1	1	1	1	1	1	1	1	1	1
SO	1	1	1	1	1	1	1	1	1	1	1
Method	line-22	line-23	line-24	line-25	line-26	line-27	line-28	line-29	line-30	line-31	line-32
P-DRO	1	1	1	2	2	1	1	1	1	1	1
D-DRO	1	1	1	2	1	1	1	1	1	1	1
SO	1	1	1	1	1	1	1	1	1	1	1

Table 8 Planning schemes of different methods in the 99-node system

Method	Capacity of substation (MW)	Table 8 Planning schemes of different methods in the 99-node system Type of lines									
		Line-1	Line-2	Line-3	Line-4	Line-5	Line-6	Line-7	Line-8	Line-9	Line-10
P-DRO	17.23	9	1	1	1	1	1	1	1	1	1
D-DRO	15.48	9	1	1	1	1	1	1	1	1	1
SO	15.12	9	1	1	1	1	1	1	1	1	1
Method	line-11	line-12	line-13	line-14	line-15	line-16	line-17	line-18	line-19	line-20	line-21
P-DRO	7	1	7	1	7	2	1	1	1	1	1
D-DRO	7	1	7	1	7	2	1	1	1	1	1
SO	7	1	7	1	7	2	1	1	1	1	1
Method	line-22	line-23	line-24	line-25	line-26	line-27	line-28	line-29	line-30	line-31	line-32
P-DRO	1	1	5	1	1	1	1	5	1	1	1
D-DRO	1	1	5	1	1	1	1	5	1	1	1
SO	1	1	5	1	1	1	1	4	1	1	1
Method	line-33	line-34	line-35	line-36	line-37	line-38	line-39	line-40	line-41	line-42	line-43
P-DRO	1	1	1	1	3	3	2	1	2	2	1
D-DRO	1	1	1	1	3	3	2	1	2	2	1
SO	1	1	1	1	2	2	2	1	2	2	1
Method	line-44	line-45	line-46	line-47	line-48	line-49	line-50	line-51	line-52	line-53	line-54
P-DRO	1	1	1	1	1	1	1	1	1	4	4
D-DRO	1	1	1	1	1	1	1	1	1	4	4
SO	1	1	1	1	1	1	1	1	1	4	4
Method	line-55	line-56	line-57	line-58	line-59	line-60	line-61	line-62	line-63	line-64	line-65
P-DRO	1	4	4	1	3	1	1	3	1	3	1
D-DRO	1	4	4	1	3	1	1	3	1	3	1
SO	1	3	3	1	3	1	1	3	1	3	1
Method	line-66	line-67	line-68	line-69	line-70	line-71	line-72	line-73	line-74	line-75	line-76
P-DRO	3	1	1	1	1	3	1	2	1	2	1
D-DRO	3	1	1	1	1	3	1	2	1	2	1
SO	3	1	1	1	1	2	1	2	1	2	1
Method	line-77	line-78	line-79	line-80	line-81	line-82	line-83	line-84	line-85	line-86	line-87
P-DRO	2	1	1	1	1	1	1	1	1	1	1
D-DRO	2	1	1	1	1	1	1	1	1	1	1
SO	1	1	1	1	1	1	1	1	1	1	1
Method	line-88	line-89	line-90	line-91	line-92	line-93	line-94	line-95	line-96	line-97	line-98
P-DRO	1	1	1	1	1	1	1	1	1	1	1
D-DRO	1	1	1	1	1	1	1	1	1	1	1
SO	1	1	1	1	1	1	1	1	1	1	1