Table 1. Parameters of SGs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type | U155 | U350 | U76 | U197 |
| Capacity (MW) | 155 | 350 | 76 | 197 |
| *a* ($/MW2) | 0.00015 | 0.00005 | 0.00050 | 0.00010 |
| *b* ($/MW) | 30 | 20 | 45 | 35 |
| *c* ($) | 2 | 4 | 6 | 6 |
| Start-up cost ($) | 2 | 4 | 6 | 6 |
| Minimum online time (h) | 8 | 8 | 4 | 4 |
| Minimum offline time (h) | 8 | 8 | 4 | 4 |
| Upward reserve cost ($/MW) | 2 | 4 | 6 | 6 |
| Downward reserve cost ($/MW) | 2 | 4 | 6 | 6 |
| PFR cost ($/MW) | 2 | 4 | 6 | 6 |
| Ramp capacity | 50% | 50% | 80% | 80% |
| Minimum output | 35% | 50% | 20% | 20% |
| Inertia (MW·s) | 930 | 2800 | 304 | 1182 |
| Governor constant (p.u.) | 0.35 | 0.15 | 0.48 | 0.18 |

Table 2. Parameters of HVDC

|  |  |  |  |
| --- | --- | --- | --- |
| Type | HVDC1 | HVDC2 | HVDC3 |
| Maximum transmission power (MW) | 120 | 130 | 100 |
| Minimum transmission power (MW) | 15 | 15 | 10 |
| Maximum adjustment capacities (MW) | 100 | 100 | 75 |
| Minimum adjustment capacities (MW) | 15 | 15 | 10 |
| Maximum number of adjustments | 12 | 12 | 12 |
| Maximum number of reverses | 6 | 6 | 6 |
| DC voltage (kV) | 300 | 300 | 300 |
| DC capacitor (mF) | 3 | 3 | - |
| Capacitor number | 2 | 2 | - |
| Upper of virtual inertia (MW·s) | 488 | 542 | - |
| Lower of droop coefficient (p.u.) | 0.33 | 0.33 | - |
| Voltage variation margin (p.u.) | 0.15 | 0.15 | - |
| Overload coefficient | 0.25 | 0.25 | - |

Table 3. Types of SGs included in each region

|  |  |  |  |
| --- | --- | --- | --- |
| Region | SG number | Type | SGs Capability (MW) |
| 1 | G1-G2 | U350 | 1706 |
| G3-G8 | U155 |
| G9 | U76 |
| 2 | G10-G11 | U197 | 1084 |
| G12-G13 | U155 |
| G14-G18 | U76 |