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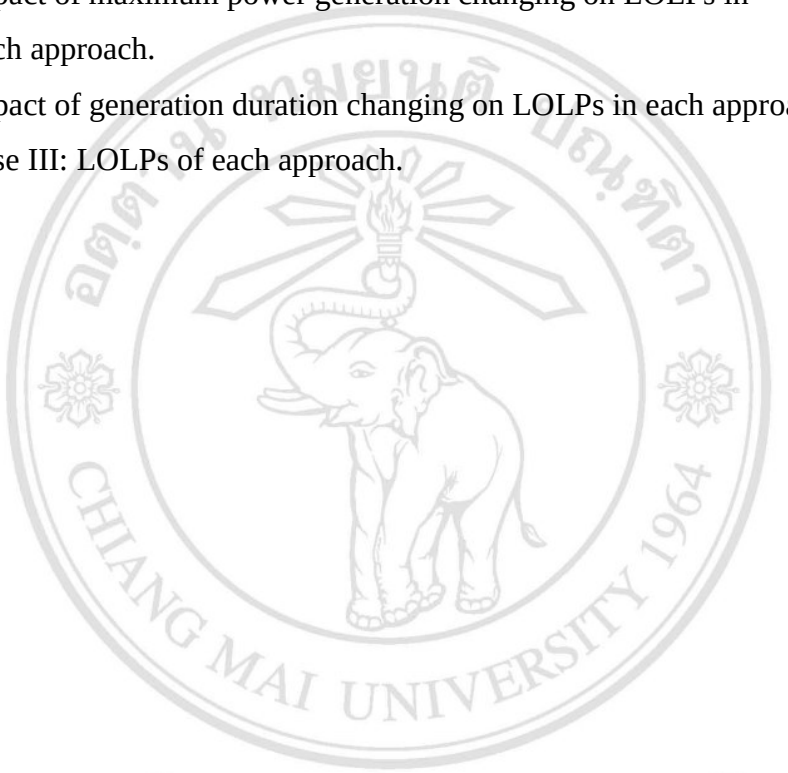

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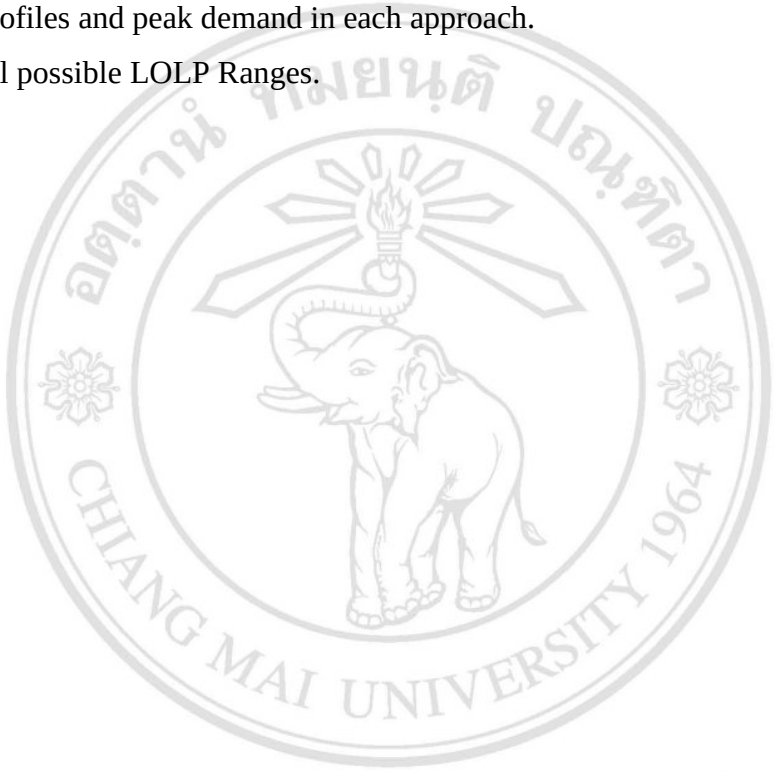

LIST OF ABBREVIATIONS

CC	Capacity Credit
CF	Capacity Factor
COPT	Capacity Outage Probability Table
EC	Effective Capacity
ECPP	Equivalent Conventional Power Plant
EENS	Expected Energy Not Supplied
EFC	Equivalent Firm Capacity
EFOR	Equivalent Forced Outage Rate
ELCC	Effective Load Carrying Capability
ELDC	Equivalent Load Duration Curve
FOH	Forced Outage Hour
FOR	Force Outage Rate
GC	Guaranteed Capacity
ILDC	Inverted Load Duration Curve
LDC	Load Duration Curve
LOLE	Loss of Load Expectation
LOLP	Loss of Load Probability
LPT	Load Probability Table
MTTF	Mean Time to Failure
MTTR	Mean Time to Repair
PV	Photovoltaic
SH	Service Hour
STC	Standard Test Condition

LIST OF SYMBOLS

η_C	Cell efficiency
η_G	Generator efficiency
η_I	Inverter efficiency
η_T	Turbine efficiency
η_{TH}	Thermal efficiency of a power plant
λ	Expected failure rate
μ	Expected repair rate
ν	Wind speed
ν_I	Cut-in wind speed
ν_O	Cut-out wind speed
ν_R	Rated wind speed
ρ_A	Air density
ρ_W	Water density
ϑ	Cell temperature
ϑ_{STC}	Cell temperature at standard test condition
A	Unit availability
A_p	Panel area
A_S	Swept area of the rotor
AM_{STC}	Air mass at standard test condition
C	Generation capacity of unit
C_i	Capacity outage of state i for the unit being added
C_p	Performance coefficient of wind turbine
${}^nC_{nr}$	Number of combination of nr items from n items
CK	Installed capacity of the benchmark unit
D	Power demand
E_k	Energy curtailed of the k-th outage

EC_I	Effective capacity (Definition I)
EC_{II}	Effective capacity (Definition II)
EL	Equivalent load
f	Cycle frequency
F	Feed rate
$F(\bullet)$	Old cumulative distribution of load level
$F'(\bullet)$	New cumulative distribution of load level
FF	Fill factor
g	Gravitational acceleration
G_{BG}	Output power of biogas unit
G_{BM}	Output power of biomass unit
G_H	Output power of small hydro unit
G_{PV}	Output power of PV panel
G_W	Output power of wind turbine
G_W^{rated}	Rated power of wind turbine
H	Water head
I_r	Solar irradiance density
I_{SC}	Short circuit current
$I_{r,STC}$	Solar irradiance density at standard test condition
m	Mean time to failure (MTTF)
n	Number of unit states
O_k	Magnitude of the k-th outage in the system
p_i	Probability of existence of the unit state i
p_k	Probability of a capacity outage of magnitude
P_{nr}	Probability of nr units in the down state
P_{MPP}	Power at maximum power point
$P(X)$	Cumulative probability of capacity outage state of X MW after the unit is added.
$P'(X)$	Cumulative probability of capacity outage state of X MW before the unit is added.
Q	Water flow rate
r	Mean time to repair (MTTR)

R	Risk of power deficit
RK	Installed capacity of the unit of interest
S	System capacity
T	Cycle time
U	Unit unavailability, FOR
V	Heating value of fuel
V_{OC}	Open circuit voltage
X	Capacity outage state
X	Equivalent load of all units except unit of interest which has the same risk of power deficit (Only in Chapter 4)
$X1$	Capacity level that will be exceeded with R of ELDC of all units.
$X2$	Capacity level that will be exceeded with R of ELDC of all units except unit of interest.

Subscripts

i	Unit state
j	Index of Unit
k	The order of outage in the system
l	Index of discretized capacity available in generation system
N	Number of identical units
nr	Number of units in the failed state
IA	Approach IA
IB	Approach IB
IC	Approach IC

Superscripts

N	Number of units

ข้อความแห่งการริเริ่ม

1) แบบจำลองผลิตไฟฟ้าของแหล่งพลังงานหมุนเวียนถูกนำเสนอเพื่อใช้ในการประเมินความเชื่อถือได้ของการผลิตไฟฟ้าและการวางแผนผลิตไฟฟ้า

2) วิธีการประเมินค่าถูกกำหนดเพื่อหาสัดส่วนผลิตไฟฟ้าที่เหมาะสมของแหล่งพลังงานหมุนเวียนในระบบผลิตไฟฟ้า

3) เกณฑ์ความเชื่อถือได้และการวางแผนผลิตไฟฟ้าได้รับการทบทวนเมื่อมีแหล่งพลังงานหมุนเวียนรวมอยู่อย่างมีนัยสำคัญ

STATEMENTS OF ORIGINALITY

1) The generation models of renewable energy resources are proposed for using in generation reliability assessment and generation planning.

2) Evaluation method is proposed to determine proper penetration level of renewable energy resources in generation system.

3) The generation reliability and planning criteria are reviewed under the significant presence of renewable energy resources.