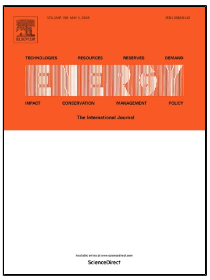
Accepted Manuscript



Optimal Design and Operating Strategies for a Biomass-Fueled Combined Heat and Power System with Energy Storage

Yingying Zheng, Bryan M. Jenkins, Kurt Kornbluth, Alissa Kendall, Chresten Træholt

PII:	S0360-5442(18)30856-9
DOI:	10.1016/j.energy.2018.05.036
Reference:	EGY 12869
To appear in:	*Energy*
Received Date:	26 October 2017
Revised Date:	03 May 2018
Accepted Date:	05 May 2018

Please cite this article as: Yingying Zheng, Bryan M. Jenkins, Kurt Kornbluth, Alissa Kendall, Chresten Træholt, Optimal Design and Operating Strategies for a Biomass-Fueled Combined Heat and Power System with Energy Storage, *Energy* (2018), doi: 10.1016/j.energy.2018.05.036

Optimal Design and Operating Strategies for a Biomass-Fueled Combined Heat and Power System with Energy Storage

Yingying Zheng[a,*], Bryan M. Jenkins[a], Kurt Kornbluth[a], Alissa Kendall[b], Chresten Træholt[c]

[a] Dept. of Biological and Agricultural Engineering, University of California, Davis, One Shields Avenue, Davis, CA 95616, USA. *corresponding author

[b] Dept. of Civil and Environmental Engineering, University of California, Davis, One Shields Avenue, Davis, CA 95616, USA.

[c] Dept. of Electrical Engineering, Technical University of Denmark, Elektrovej, 2800 Kgs. Lyngby, Denmark.

Nomenclature

Abbreviations

CHP	combined heat and power
BCHP	biomass-based CHP
BGS	biomass gasifier
ICE	internal combustion engine
HOB	heat-only boiler
ES	energy storage
PGS	producer gas storage
TES	thermal energy storage

Symbols

E	electricity demand (kWh)
H	heat demand (kWh)
Z	net acquisition cost ($)
P	purchase and installation cost ($)
O&M	operation & maintenance cost ($/kWh)
C	hourly capital cost ($/h)
M	rated capacity (kW)
N	expected life (years)
ir	interest rate
s	economic scaling factor
T	length of planning horizon (h)
V	set of all system components that contribute to capital cost
U	set of all system components that contribute to O&M cost
x	decision variable: hourly energy flows (kWh/h)

Superscripts and subscripts

t	time step (h)
p	actual facility
o	reference facility
i	index of installed units that contribute to capital cost