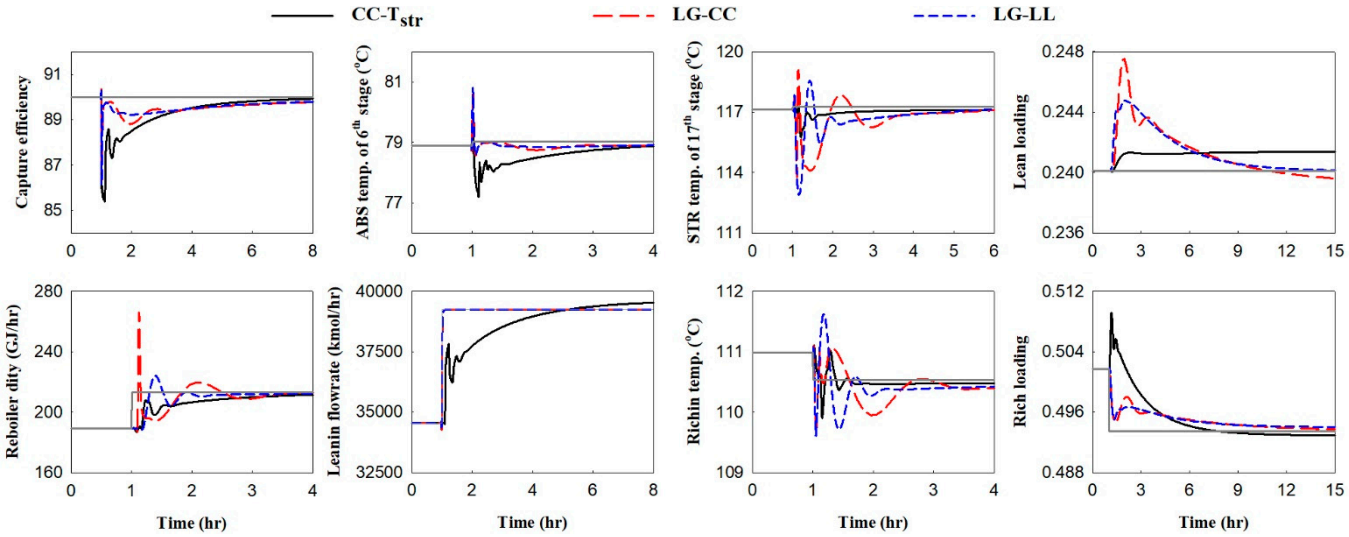
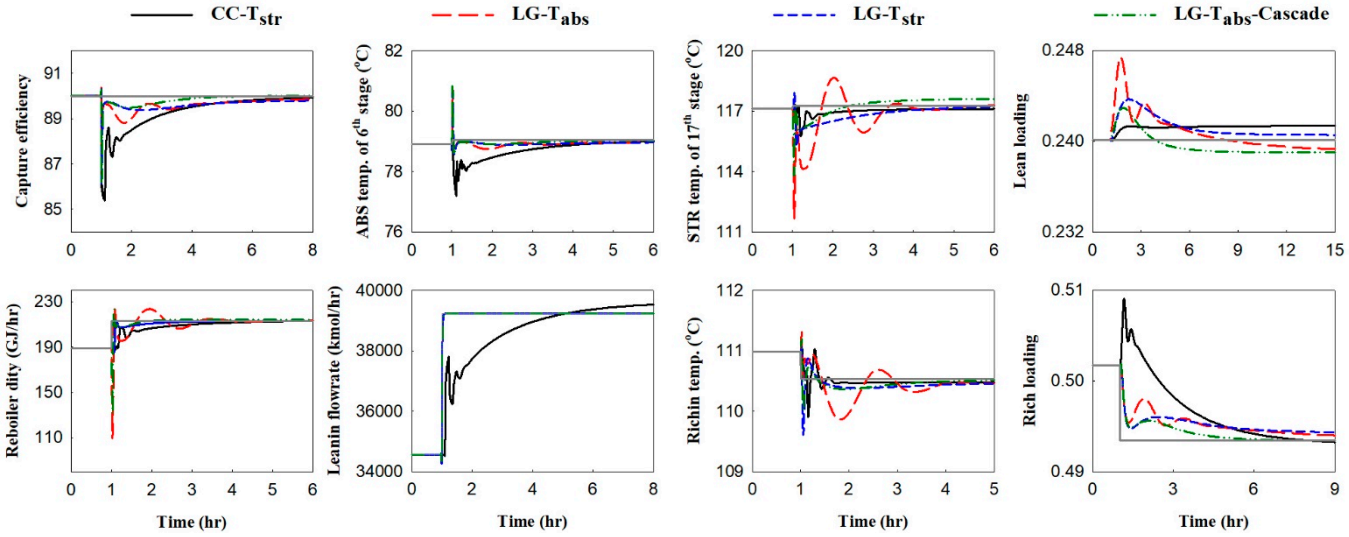
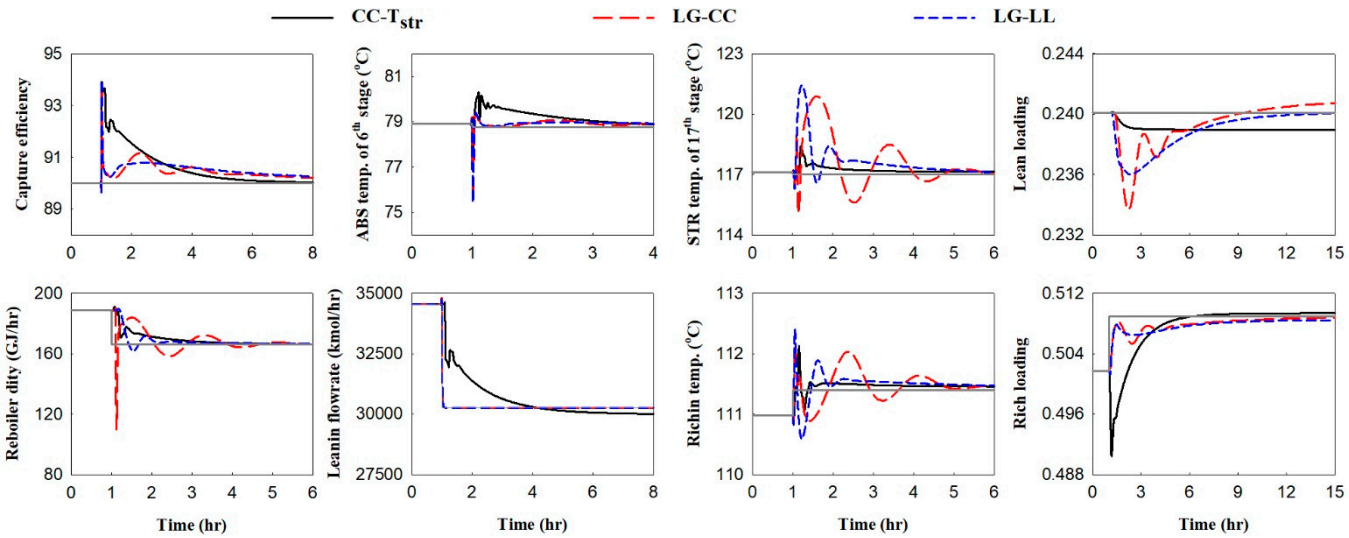

CC-T$_{str}$
LG-CC
LG-LL
Capture efficiency
ABS temp. of 6th stage (°C)
STR temp. of 17th stage (°C)
Lean loading
Reboiler dity (GJ/hr)
Leanin flowrate (kmol/hr)
Richin temp. (°C)
Rich loading
Time (hr)

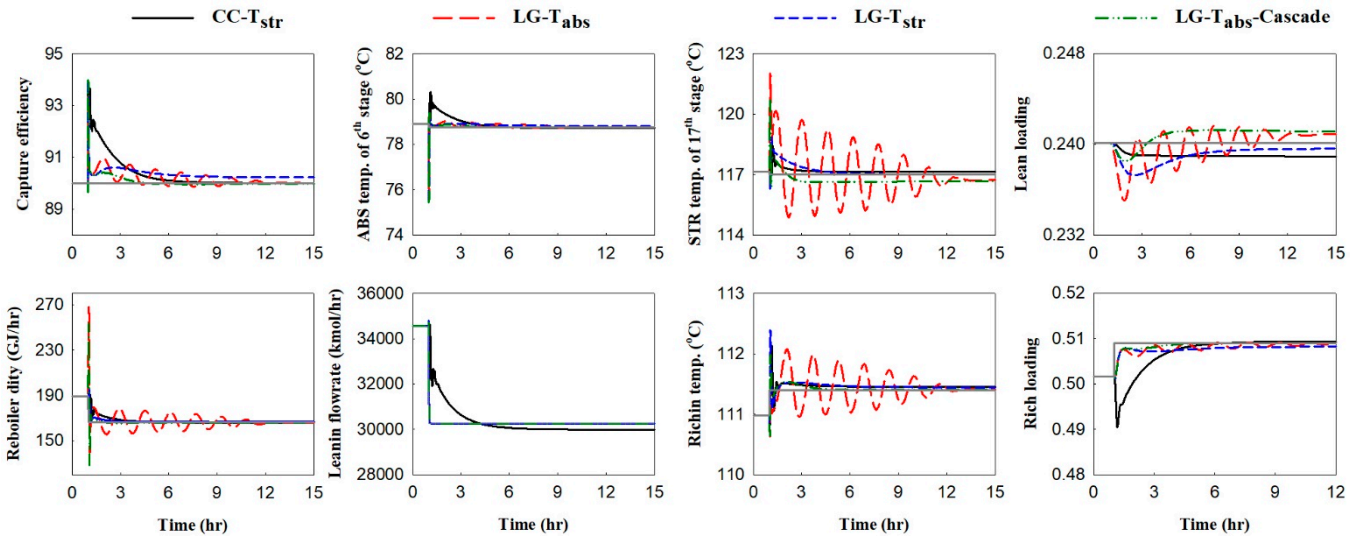
(a)


CC-T$_{str}$
LG-T$_{abs}$
LG-T$_{str}$
LG-T$_{abs}$-Cascade
Capture efficiency
ABS temp. of 6th stage (°C)
STR temp. of 17th stage (°C)
Lean loading
Reboiler dity (GJ/hr)
Leanin flowrate (kmol/hr)
Richin temp. (°C)
Rich loading
Time (hr)

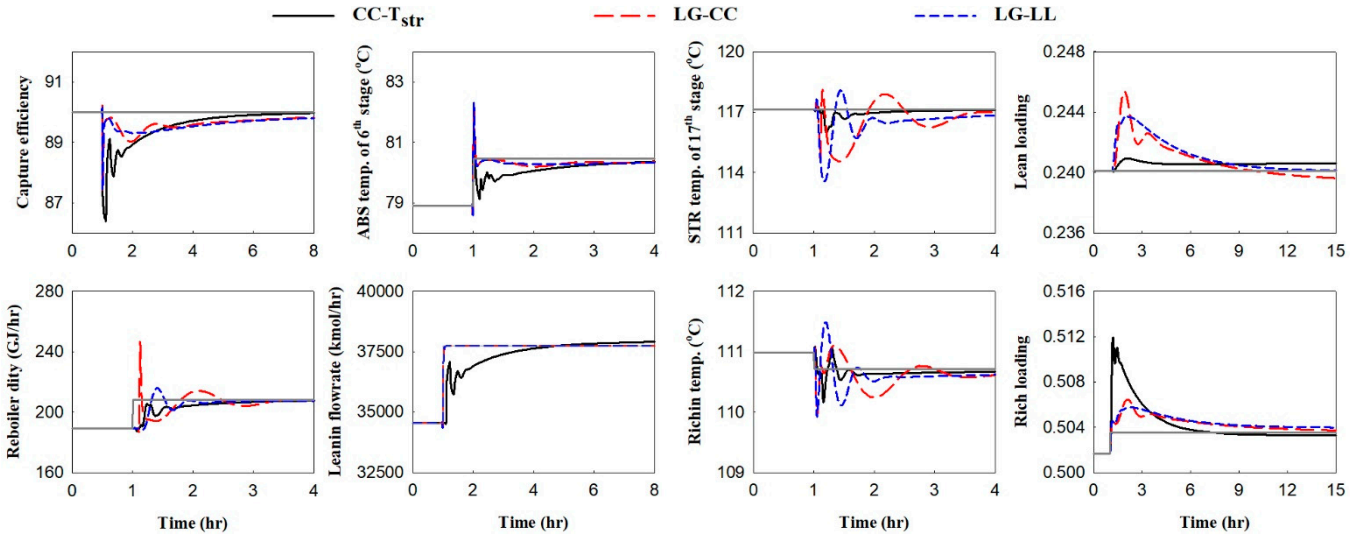
(b)


CC-T$_{str}$
LG-CC
LG-LL
Capture efficiency
ABS temp. of 6th stage (°C)
STR temp. of 17th stage (°C)
Lean loading
Reboiler dity (GJ/hr)
Leanin flowrate (kmol/hr)
Richin temp. (°C)
Rich loading
Time (hr)

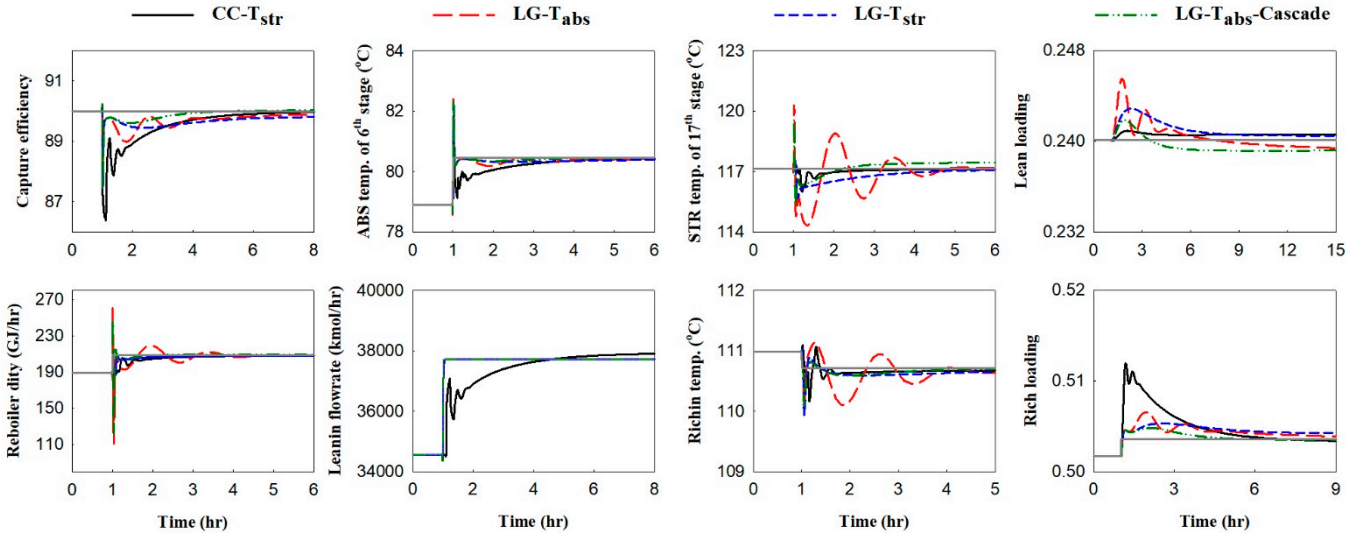
(c)


CC-Tstr
LG-Tabs
LG-Tstr
LG-Tabs-Cascade
Capture efficiency
ABS temp. of 6th stage (°C)
STR temp. of 17th stage (°C)
Lean loading
Reboiler dity (GJ/hr)
Leanin flowrate (kmol/hr)
Richin temp. (°C)
Rich loading
Time (hr)

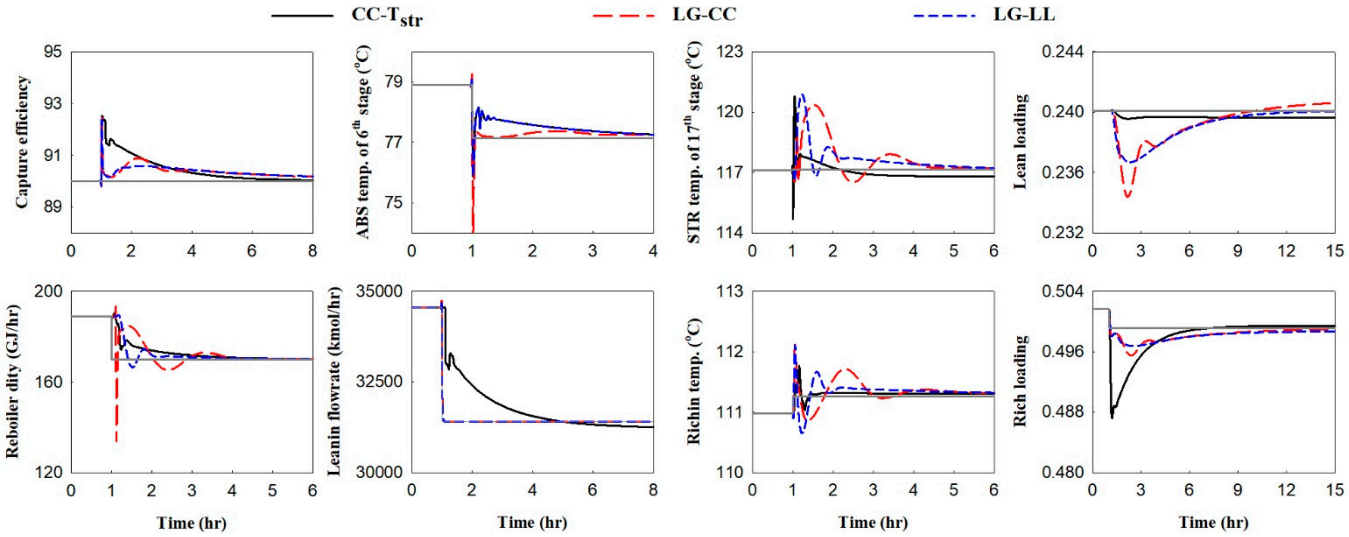
(d)


CC-Tstr
LG-CC
LG-LL
Capture efficiency
ABS temp. of 6th stage (°C)
STR temp. of 17th stage (°C)
Lean loading
Reboiler dity (GJ/hr)
Leanin flowrate (kmol/hr)
Richin temp. (°C)
Rich loading
Time (hr)

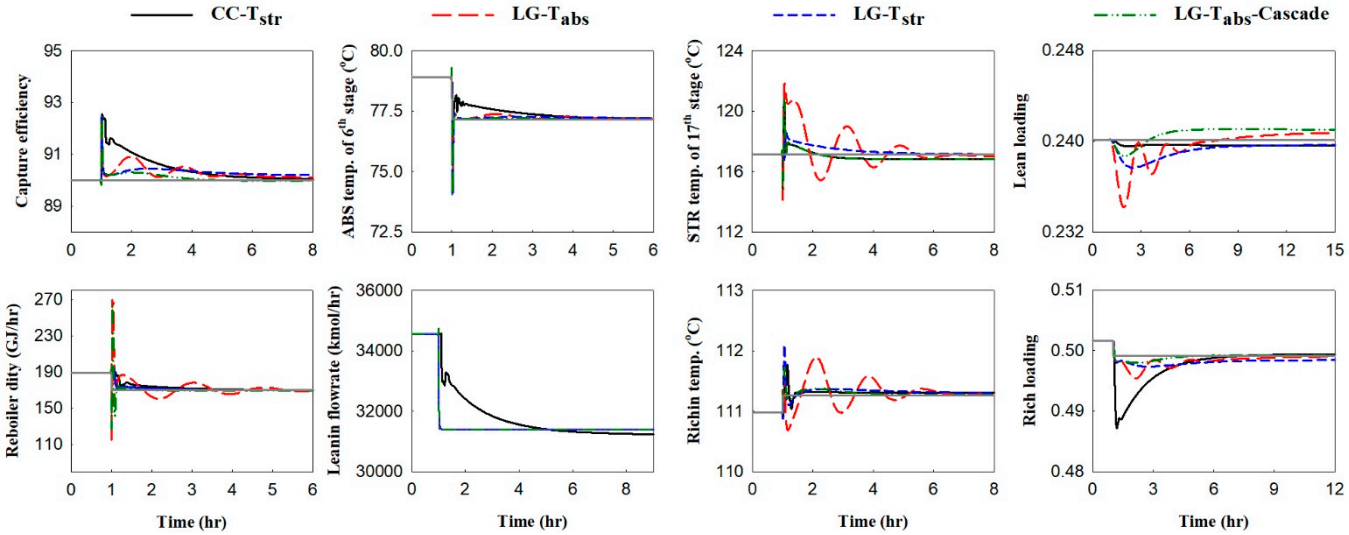
(e)


CC-Tstr
LG-Tabs
LG-Tstr
LG-Tabs-Cascade
Capture efficiency
ABS temp. of 6th stage (°C)
STR temp. of 17th stage (°C)
Lean loading
Reboiler dity (GJ/hr)
Leanin flowrate (kmol/hr)
Richin temp. (°C)
Rich loading
Time (hr)

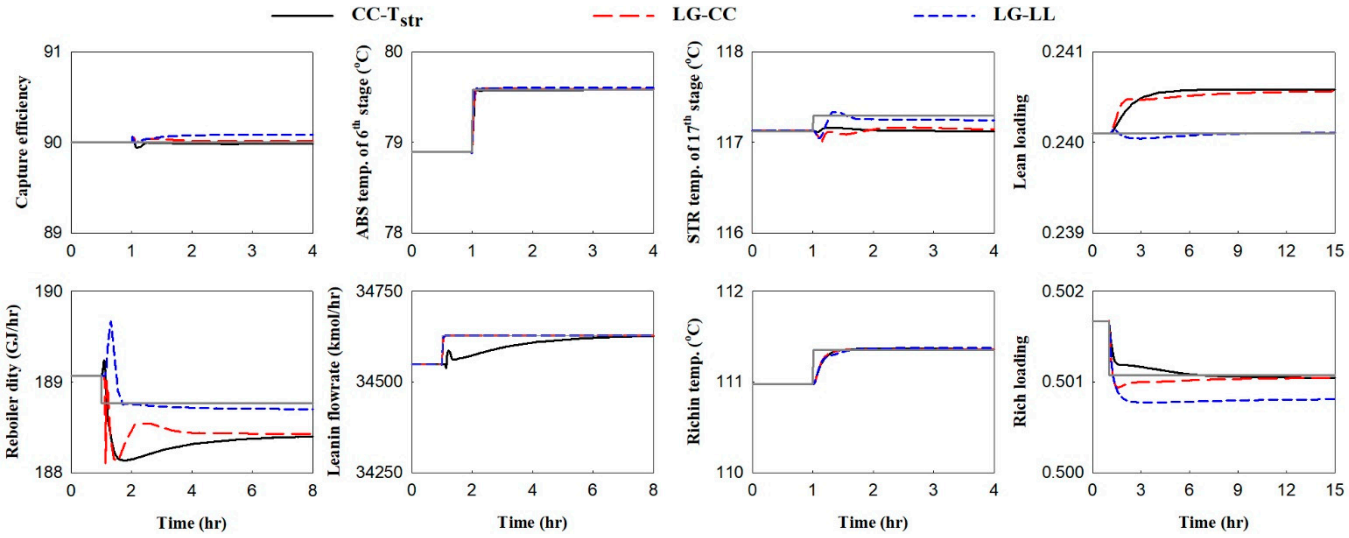
(f)


CC-T$_{str}$
LG-CC
LG-LL
Capture efficiency
ABS temp. of 6th stage (°C)
STR temp. of 17th stage (°C)
Lean loading
Reboiler dity (GJ/hr)
Leanin flowrate (kmol/hr)
Richin temp. (°C)
Rich loading
Time (hr)

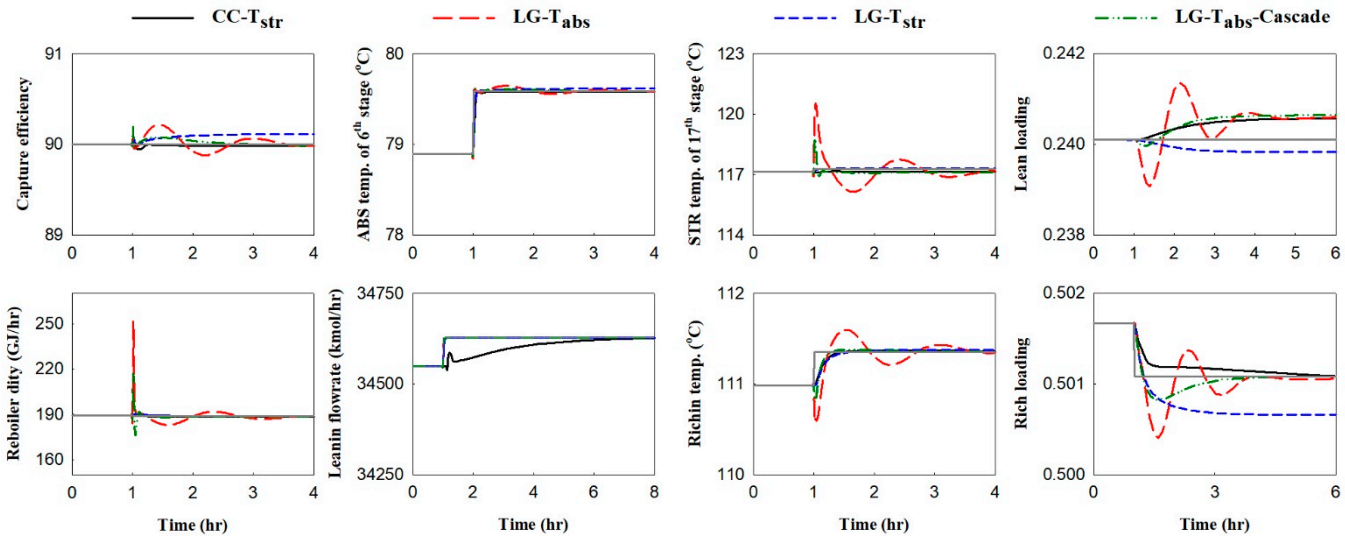
(g)


CC-T$_{str}$
LG-T$_{abs}$
LG-T$_{str}$
LG-T$_{abs}$-Cascade
Capture efficiency
ABS temp. of 6th stage (°C)
STR temp. of 17th stage (°C)
Lean loading
Reboiler dity (GJ/hr)
Leanin flowrate (kmol/hr)
Richin temp. (°C)
Rich loading
Time (hr)

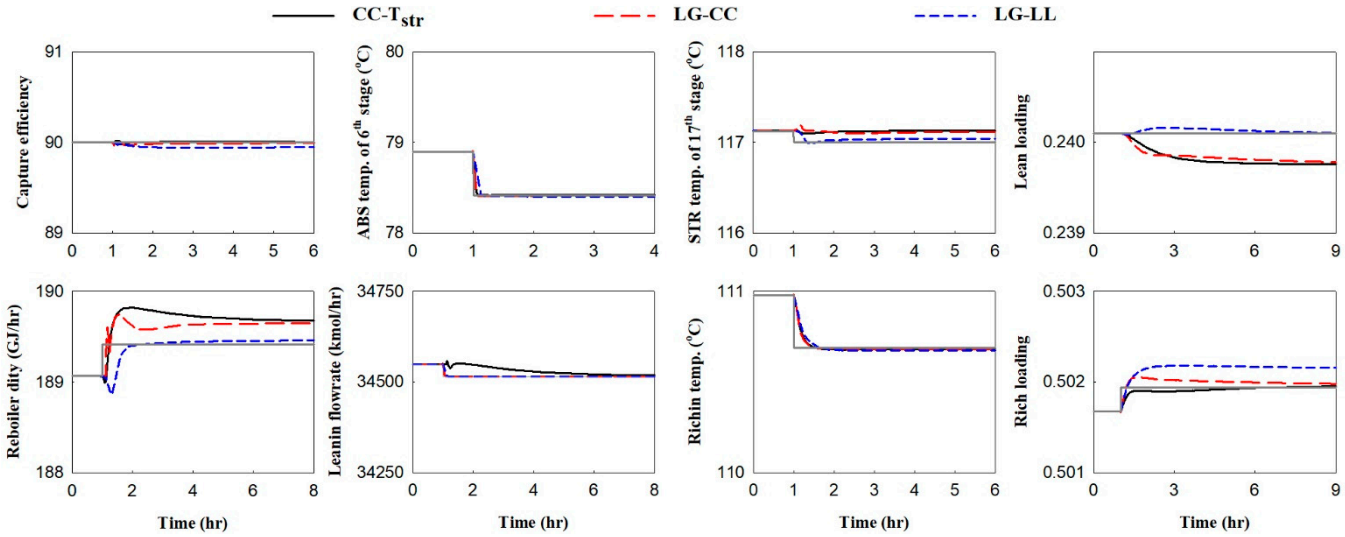
(h)


CC-T$_{str}$
LG-CC
LG-LL
Capture efficiency
ABS temp. of 6th stage (°C)
STR temp. of 17th stage (°C)
Lean loading
Reboiler dity (GJ/hr)
Leanin flowrate (kmol/hr)
Richin temp. (°C)
Rich loading
Time (hr)

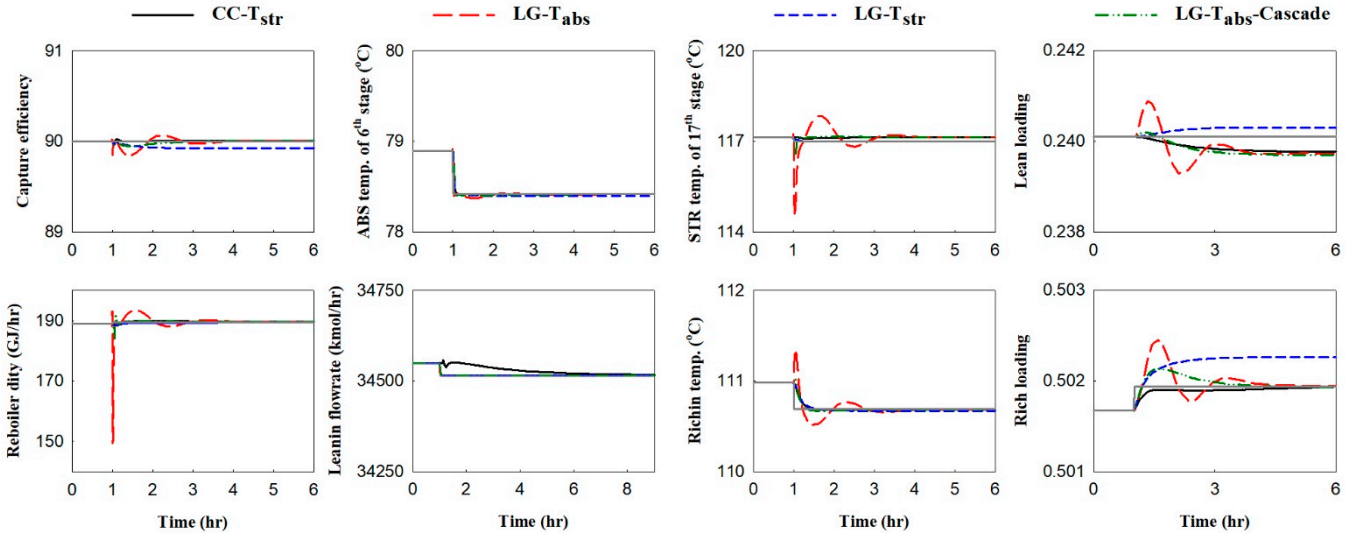
(i)



(j)



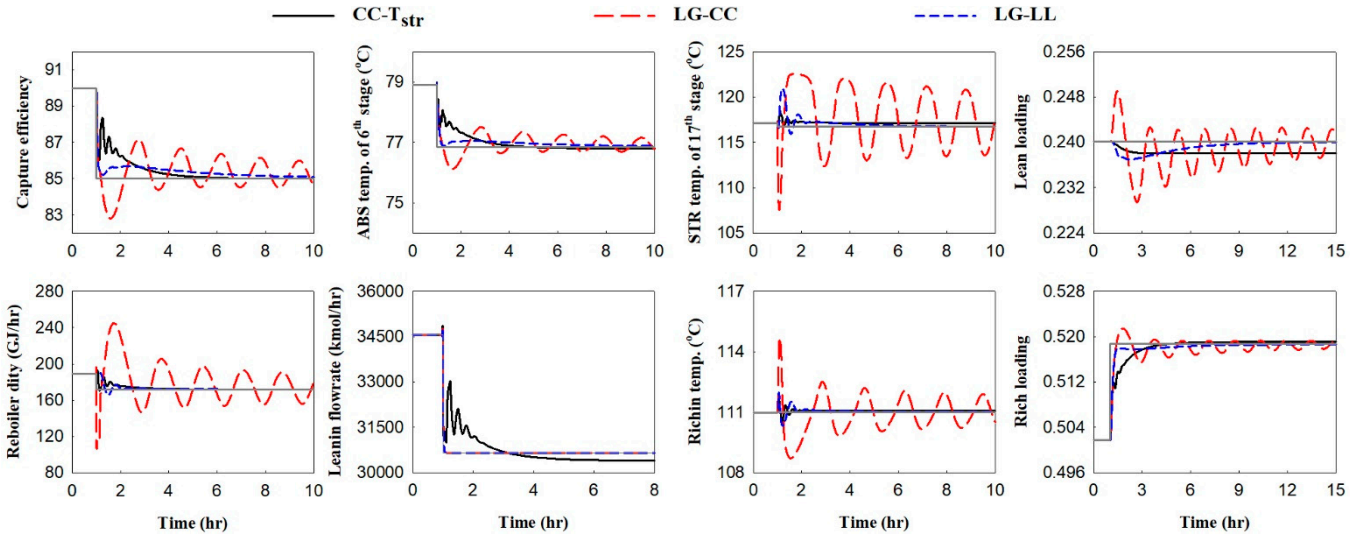
(k)



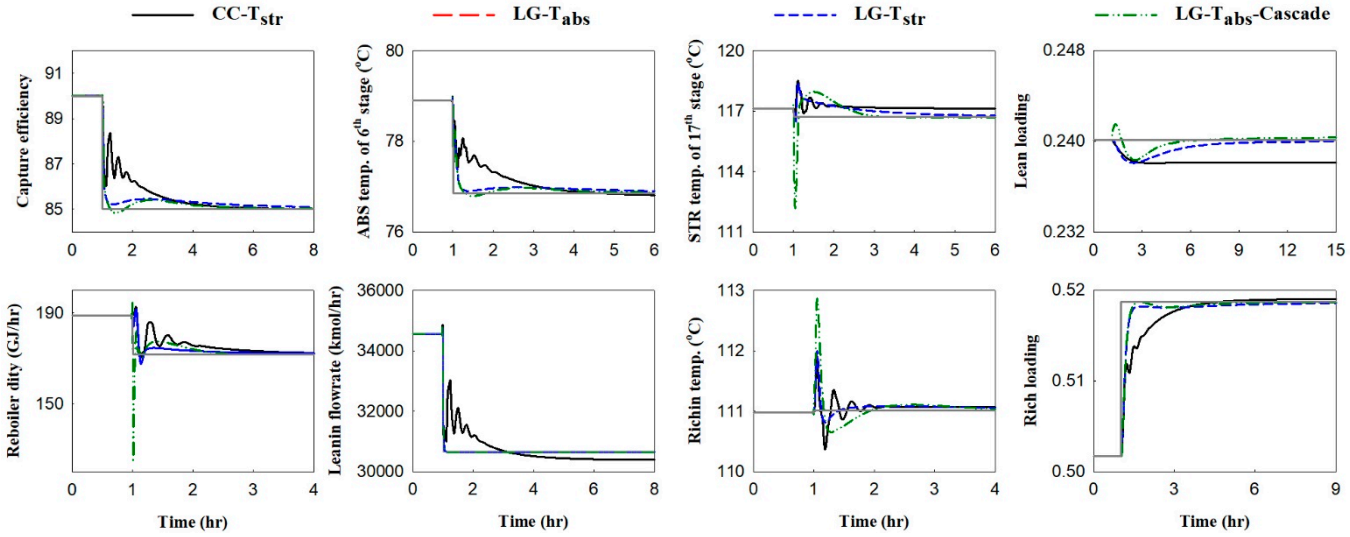
(l)

Figure S1. Dynamic responses for disturbance changes of flue gas conditions. (**a**) 10% increase of flue gas flowrate –

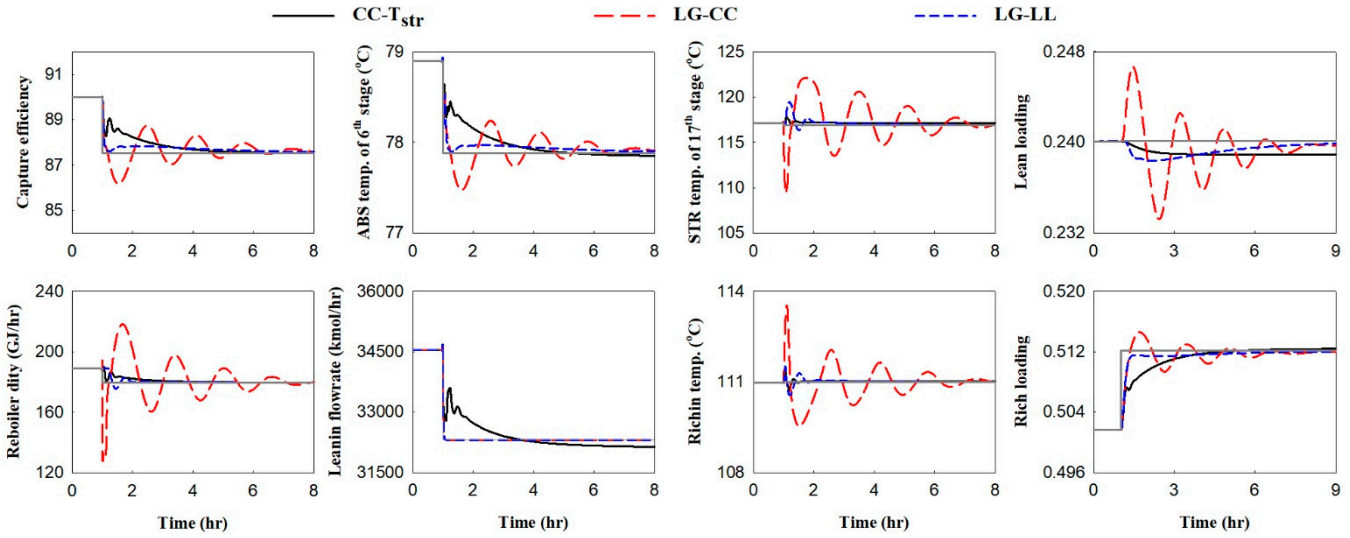
concentration-control related schemes; (**b**) 10% increase of flue gas flowrate – temperature-control related schemes; (**c**) 10% decrease of flue gas flowrate – concentration-control related schemes; (**d**) 10% decrease of flue gas flowrate – temperature-control related schemes; (**e**) 10% increase of flue gas concentration – concentration-control related schemes; (**f**) 10% increase of flue gas concentration – temperature-control related schemes; (**g**) 10% decrease of flue gas concentration – concentration-control related schemes; (**h**) 10% decrease of flue gas concentration – temperature-control related schemes; (**i**) 12.5% increase of flue gas temperature – concentration-control related schemes; (**j**) 12.5% increase of flue gas temperature – temperature-control related schemes; (**k**) 12.5% decrease of flue gas temperature – concentration-control related schemes; (**l**) 12.5% decrease of flue gas temperature – temperature-control related schemes


CC-T$_{str}$
LG-CC
LG-LL
Capture efficiency
ABS temp. of 6th stage (°C)
STR temp. of 17th stage (°C)
Lean loading
Reboiler dity (GJ/hr)
Leanin flowrate (kmol/hr)
Richin temp. (°C)
Rich loading
Time (hr)

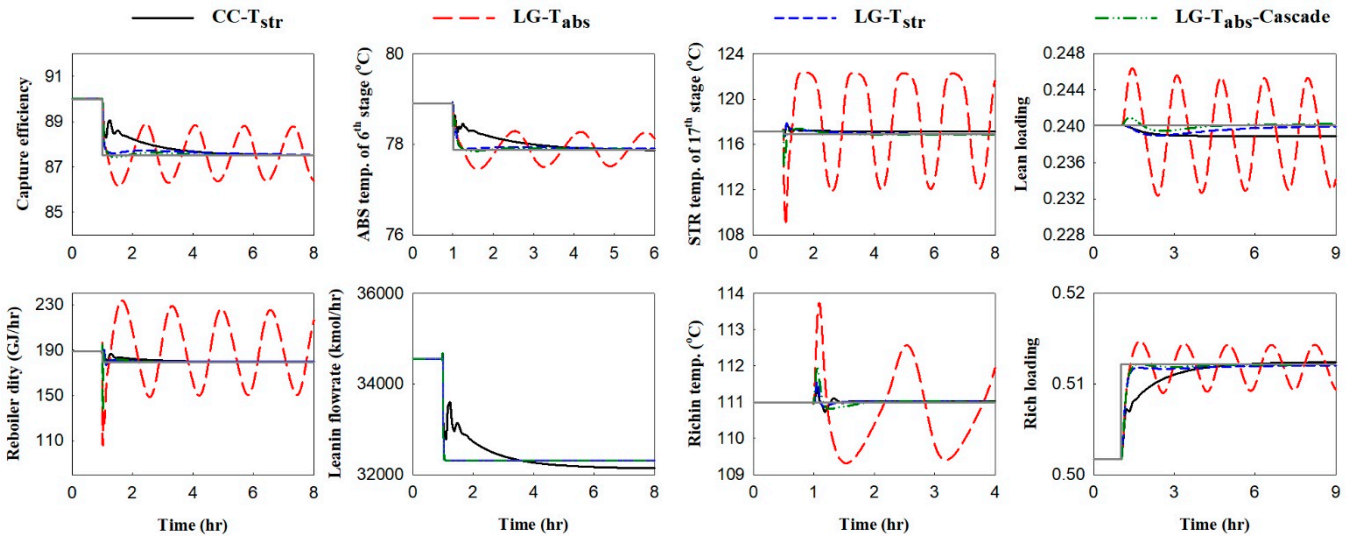
(a)


CC-T$_{str}$
LG-T$_{abs}$
LG-T$_{str}$
LG-T$_{abs}$-Cascade
Capture efficiency
ABS temp. of 6th stage (°C)
STR temp. of 17th stage (°C)
Lean loading
Reboiler dity (GJ/hr)
Leanin flowrate (kmol/hr)
Richin temp. (°C)
Rich loading
Time (hr)

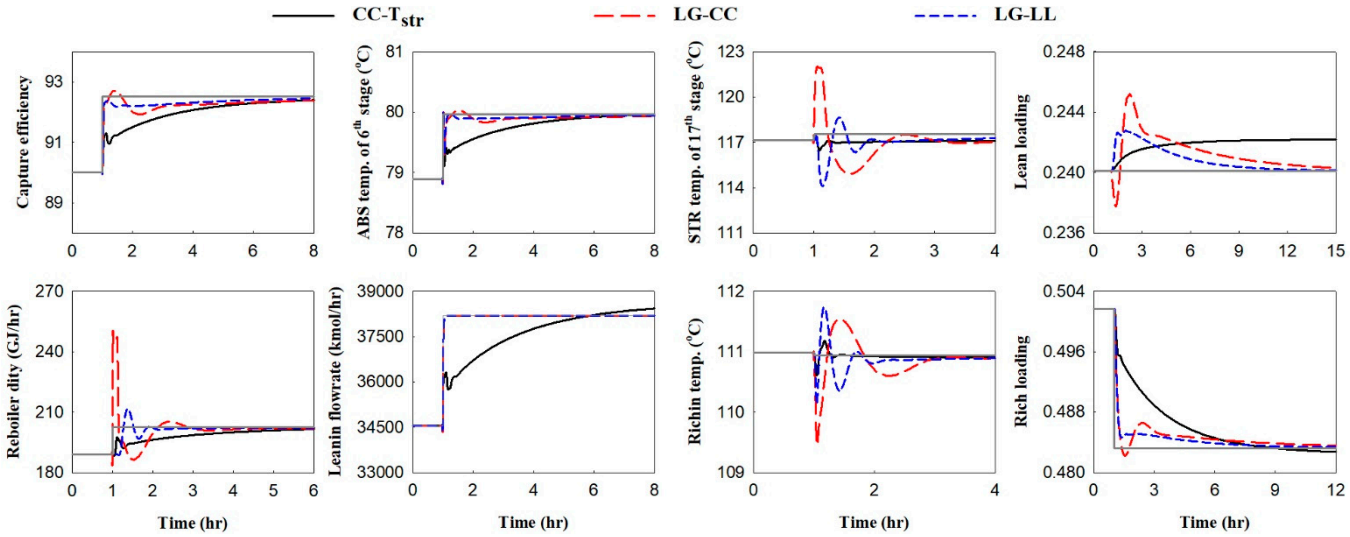
(b)


CC-T$_{str}$
LG-CC
LG-LL
Capture efficiency
ABS temp. of 6th stage (°C)
STR temp. of 17th stage (°C)
Lean loading
Reboiler dity (GJ/hr)
Leanin flowrate (kmol/hr)
Richin temp. (°C)
Rich loading
Time (hr)

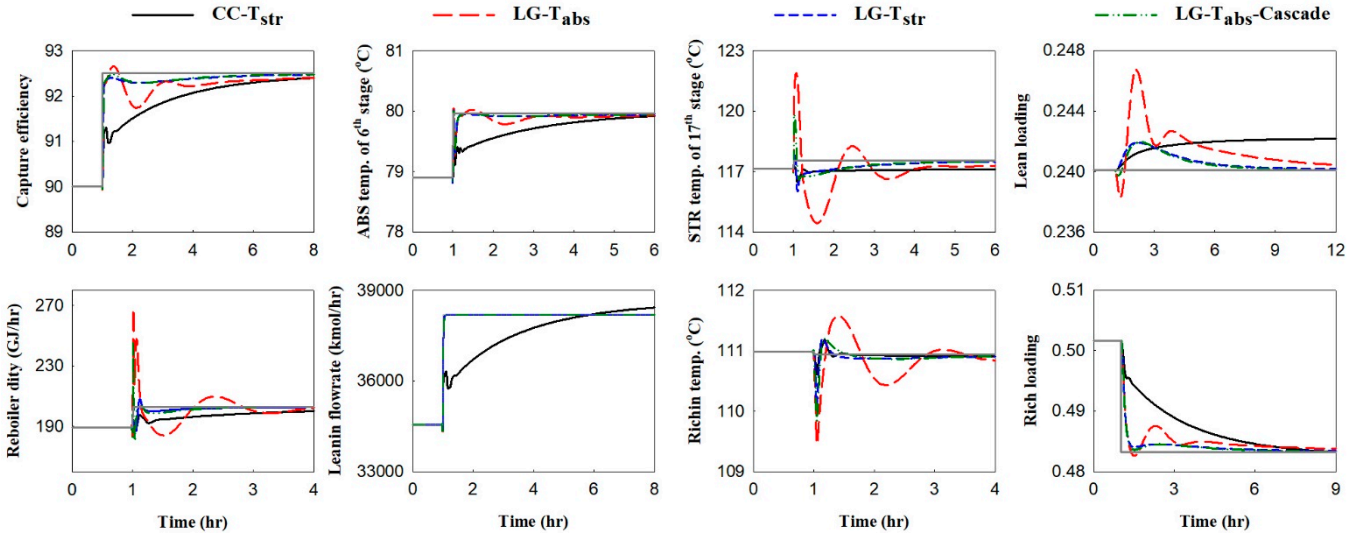
(c)


CC-Tstr
LG-Tabs
LG-Tstr
LG-Tabs-Cascade
Capture efficiency
ABS temp. of 6th stage (°C)
STR temp. of 17th stage (°C)
Lean loading
Reboiler dity (GJ/hr)
Leanin flowrate (kmol/hr)
Richin temp. (°C)
Rich loading
Time (hr)

(d)

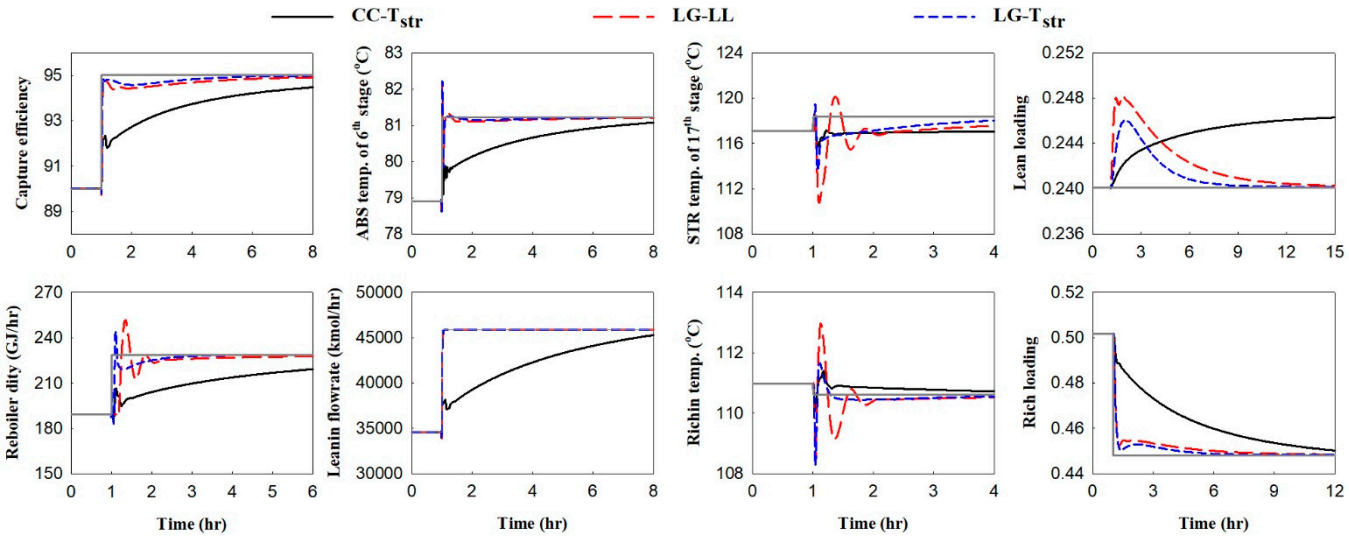

CC-Tstr
LG-CC
LG-LL
Capture efficiency
ABS temp. of 6th stage (°C)
STR temp. of 17th stage (°C)
Lean loading
Reboiler dity (GJ/hr)
Leanin flowrate (kmol/hr)
Richin temp. (°C)
Rich loading
Time (hr)

(e)


CC-Tstr
LG-Tabs
LG-Tstr
LG-Tabs-Cascade
Capture efficiency
ABS temp. of 6th stage (°C)
STR temp. of 17th stage (°C)
Lean loading
Reboiler dity (GJ/hr)
Leanin flowrate (kmol/hr)
Richin temp. (°C)
Rich loading
Time (hr)

(f)

(1) 90% to 95%



(g)

Figure S2. Dynamic responses for set-point changes of CO_2 capture efficiency. (**a**) 90% to 85% - concentration-control related schemes; (**b**) 90% to 85% - temperature-control related schemes; (**c**) 90% to 87.5% - concentration-control related schemes; (**d**) 90% to 87.5% - temperature-control related schemes; (**e**) 90% to 92.5% - concentration-control related schemes; (**f**) 90% to 92.5% - temperature-control related schemes; (**g**) 90% to 95% - all schemes.