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(71) Applicant: **NEXT CARBON SOLUTIONS, LLC**
[US/US]; 1000 Louisiana, Suite 3900, Houston, Texas
77002 (US).

(72) Inventors: **RIVARD, Connor**; c/o NEXT CARBON SO-
LUTIONS, LLC, 1000 Louisiana, Suite 3900, Houston,
Texas 77002 (US). **KIM, Eunhwa**; c/o NEXT CARBON
SOLUTIONS, LLC, 1000 Louisiana, Suite 3900, Hous-
ton, Texas 77002 (US). **AGRAWAL, Sanjeev**; c/o NEXT
CARBON SOLUTIONS, LLC, 1000 Louisiana, Suite 3900,
Houston, Texas 77002 (US). **THOMPSON, Alex**; c/o
NEXT CARBON SOLUTIONS, LLC, 1000 Louisiana,
Suite 3900, Houston, Texas 77002 (US). **HEICHEL-
BECH, Ben**; c/o NEXT CARBON SOLUTIONS, LLC,
1000 Louisiana, Suite 3900, Houston, Texas 77002 (US).

(74) Agent: **JIANG, Jian**; K&L Gates LLP, c/o Foreign Patents,
P.O. Box 1135, Chicago, Illinois 60690-1135 (US).

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(54) Title: METHODS, SYSTEMS, AND DEVICES FOR FLUE GAS COOLING

(57) Abstract: Devices, systems, and methods for flue gas cooling for carbon capture processes are disclosed herein. A flue gas cooling process for carbon capture includes: cooling a flue gas in a direct contact cooler by a cooling water cooled in a closed cooling loop; cooling the cooling water in the closed cooling loop utilizing air-cooled heat exchangers; cooling the flue gas below a water dew point to produce a surplus water when an available cooling duty of the closed cooling loop exceeds a cooling duty required to cool the flue stream to the water dew point; storing the surplus water in a surplus water storage vessel; and directing the surplus water stored in the surplus water storage vessel to the direct contact cooler when the available cooling duty of the closed cooling loop is less than the cooling duty required to cool the flue stream to the water dew point.