

Tri-State CCR Prize

Ruleset Concepts – DRAFT v10

The CCR Prize is a **three-phase competition**:

Phase 1: “Carbon Fair” Prize Development Exhibition:

Timeline: January 1, 2011 through June 30, 2011

- Individuals and teams register to exhibit and compete via the CCR Prize website.
- Individuals and teams aggregate at a central location (e.g. creative warehouse) on June 30, 2011 where they are provided with:
 - A 10 x 10 booth-capable footprint, and a 6 x 3 table;
 - Supply of CO₂ from flue gas (@12% concentration, 1 acfm, and 30 psi);
 - Supply of electricity (@ 120V & 400A);
 - Supply of tap water (@ .15 gpm & 5 psi);
 - Water disposal piping (@ .10 gpm).
- Over a two-day period, exhibitors display their technologies, participate in networking activities, and formulate post Phase 1 visions for competing.
 - At the end of the first day, teams are lead through exercises meant to foster exposure to new technologies and approaches with the goal of facilitating team development and entries for Phase 2.
 - On the second day, individuals/teams compete for a series of prizes totaling \$100,000 including:
 - Most effective CCR technology (i.e. largest quantity of net-CO₂ recycled);
 - Most energy efficient CCR technology;
 - Most water efficient CCR technology;
 - Most innovative newly produced product from carbon;
 - Judges' choice.

Phase 2: Mobile-Scale Competition and Team Development:

Timeline: July 1, 2011 through June 30, 2012

- Teams enter and submit their technology concepts and business plans via the CCR Prize website.
- Teams pack whatever CCR equipment they're able to fit in an 80-inch by 50-inch (e.g. Ford F150 sized) pickup truck bed (or equivalent).
- Teams bring this equipment in their trucks (or equivalent) and aggregate at a central, outdoor location (e.g. Tri-State headquarters) on June 23, 2012 where they are provided with:
 - A plot of land of their requested size;
 - Supply of CO₂ from flue gas (@12% concentration, 10 acfm, and 30 psi);
 - Supply of electricity (@ 120V & 400A);
 - Supply of tap water (@ 1.5 gpm & 5 psi);
 - Water disposal piping (@ 1.0 gpm).

- Over one week, teams compete to win a \$500K first-place prize, a \$250K second-place prize, a \$150K third-place prize, and entry into Phase 3.
- Competitors will be judged on:
 - Demonstration of the highest net-carbon capture and recycling rate – quantitative;
 - Cost-effectiveness of the approach (i.e. projected revenues minus costs) – quantitative;
 - Feasibility of technological approach and commercialization plan – qualitative;
 - Scalability of and ability to deploy technology – qualitative.
- Based on a combination of quantitative results as well as the judges' expert evaluations, five Finalist Teams will be selected and invited to compete in a head-to-head competition at Sunflower Electric Power Corporation's Holcomb Station in Western Kansas.

Phase 3: Deployed Competition:

Timeline: July 1, 2012 through June 30, 2015

- Teams submit their technology concepts and business plans via the CCR Prize website.
- Between June 30, 2012 and June 30, 2014, teams collaborate, develop their approaches and technologies, deploy their technologies at Holcomb Station, and fine-tune their technologies in the "real world".
- At Holcomb Station, teams are provided with:
 - An allocation of (graded) land (with security fence), of desired size, through the competition period and six months beyond competition termination;
 - Baseline regulatory permitting;
 - Supply of CO₂ from flue gas (@12% concentration, 100 acfm, and 30 psi);
 - Supply of electricity (@ 120V & 400A);
 - Supply of fresh water (@ 15 gpm & 5 psi);
 - Water disposal piping (@ 10 gpm);
 - 24-hour on-site security;
 - Common meeting and breakout rooms;
 - Opportunities to collaborate with other competitors that may have complementary technologies/processes;
 - Exposure to media, political, and prospective investors;
- Between July 1, 2014 and June 30, 2015, teams compete to win a \$9 million cash prize, as well as commitment to deploy up to ten (10) of the winner's 400 mw sized CCR units at coal based power plants post-competition at a TBD price. Competitors will be judged based on maximizing the value of the following metric:

(net CO₂) x (Rev – Cost)

Legend	
Net CO ₂	Tons of CO ₂ recycled between July 1, 2014 and June 30, 2015, minus the amount of carbon emitted from the CCR machinery during the same period.
Rev	Revenue per ton generated from new product sale
Cost	Cost to recycle one ton of CO ₂ :

- Revenue will be configured as follows, and only credited towards the following products:
 - ASTM D4814 gasoline and ASTM D975 diesel fuel: \$3.00/gallon
 - USDA certified animal food: \$XX/ton
 - ASTM certified concrete: \$0.50/lb.
 - ASTM certified plastic: \$XX/XX
 - Electricity: \$0.10/KwH
 - Fertilizer: \$XX/ton
 - Payment for environmental services: TBD

Note: Before the launch of Phase 3, prize competitors can petition to have revenue stream added to this list. The petition process will consist of demonstration that the petitioned product's market will not be fully saturated (i.e. demand will meet or exceed supply) upon the production of material from XX gigatons of CO₂ (an amount reflecting the entire level of CO₂ emissions from all U.S. coal power plants).

- Costs will be configured as follows (but not incurred to prize entrants during the course of the competition):
 - Land: \$xx/acre
 - Water: \$XX.acre-ft
 - Wastewater: free
 - Electricity: \$0.10/KwH
 - Labor: As submitted by prize entrants, indicating both verified operating labor for the competition unit and projected operating labor under larger-scale deployment.
 - Capital costs: As submitted by prize entrants, indicating both verified capital cost of the competition unit and projected capital costs under larger-scale deployment.
- Note: Revenue and costs will be normalized to reflect performance at a 400MW coal power plant, assuming 3 MT of CO₂ recycled per year. Normalization will be based on prize competitors' verified amount of CO₂ recycled during the competition window, then scaled to reflect 3MT.

TRI-STATE CARBON CAPTURE AND RECYCLING (CCR) PRIZE

DRAFT INFORMATION FOR COMPETITORS

TOTAL PRIZE AMOUNT: \$10,000,000

ADVANCED MARKET COMMITMENT (AMC) AMOUNT: **COMMITMENT TO DEPLOY UP TO TEN (10) OF THE WINNER'S 400 MW SIZED CCR UNITS AT COAL BASED POWER PLANTS POST-COMPETITION AT A TBD PRICE**

PRIZE CRITERIA OVERVIEW:

- Cost-effectively recycle – rather than emit – carbon emissions from the equivalent of a 400 MW coal-based power plant;
- Produce carbon-based products for either the transportation fuel, food, and/or materials markets;
- Maintain energy producers' ability to provide reliable, cost-effective baseload power to their customers.

PRELIMINARY PRIZE CONCEPTS

- Technology companies will compete for a total of \$10 million as well as significant deployment commitments;
- Companies will be measured on their ability to efficiently recycle CO₂ from a normally-operating coal power plant to produce valuable product(s) (example - growing algae to produce animal feed or fuel), while consuming minimal amounts of non-renewable energy and freshwater;
- The competition will take place at a centralized, Midwest U.S.A. location, constructed explicitly to provide easy access to congressional tours and the media;

PRIZE COMPETITOR PROVISIONS (DURING PHASE 3 COMPETITION)

- Allocation of graded land (with security fence) through the competition period and six months beyond competition termination;
- Baseline regulatory permitting;
- Supply of CO₂ from flue gas (@12% concentration, 100 acfm, and 30 psi);
- Supply of electricity (@ 120V & 400A);
- Supply of [fresh/salt/waste] water (@ 15 gpm & 5 psi);
- Water disposal piping (@ 10 gpm);
- 24-hour on-site security;
- Common meeting and breakout rooms;
- Opportunities to collaborate with other competitors that may have complementary technologies/processes;
- Exposure to media, political, and prospective investors;
- Unbiased competition judging.

PRIZE COMPETITOR RESPONSIBILITIES (DURING PHASE 3 COMPETITION)

- Cost of equipment deployment at the coal-based power plant;
- Provision of equipment operating labor throughout the prize competition;
- Permitting needs beyond baseline permitting (if needed), including but not limited to tap stream emission permits and hazardous waste disposal;
- Integration and operation in harmony with normal power plant operations, including but not limited to maintenance induced and unexpected plant shutdowns;
- Equipment decommissioning labor and expenses, at prize competition completion;
- Lease of operating area post-competition (if offered and if desired);
- Obligation to license technology, under "most favored nation" terms, to prize competition sponsors (under specified terms and quantities).