Thanks for purchasing this Cornerstone Series® kit. All parts are made of plastic, so use only compatible paints and glues. Please read these instructions and study the drawings before starting.

Ethanol is big business—especially for railroads. Raw materials, or feedstocks, for ethanol production can come from many sources as diverse as sugar cane, municipal solid waste, wood, kudzu and various grains. Corn is most common, with about 70% of new plants proposed in 2009 using corn or other materials in combination with corn. With plenty of rail-served grain handling and petroleum infrastructure already in place across the continent, railroads are perfectly poised to handle ethanol-related traffic.

The ethanol production process begins with unloading corn in a shed that accommodates hoppers and trucks. Railroads haul corn in from rural elevators in covered hoppers. Carload lots and entire unit trains move to ethanol plants—how much each receives is dependent on plant size and location. For example, a 100 million gallon per year plant (typical sizes range from 50 to 110 million gallons) that receives 60% of its corn by rail gets about 17 cars per day, the rest arrives by truck from local producers. Inside the unloading shed corn is dumped into below ground bins. Augers and an elevator conveyor leg move it to storage silos. In many cases, a 10-day supply of corn is kept at the plant.

The process of converting corn into ethanol yields two products: ethanol and dried distillers grains (DDG). DDG is a protein-rich co-product of ethanol used in animal feed. In the processing center corn is milled and mixed with water to make mash. Enzymes are added to convert starches into simple sugars such as dextrose. Ammonia is added to control pH and to feed the yeast during fermentation. The mash is cooked to reduce levels of unwanted bacteria, then cooled and piped to fermentation tanks where yeast is added.

In 40 to 50 hours, the yeast has converted sugars to ethanol and carbon dioxide. The mixture of alcohol and solids, now called beer (but not the kind you would drink) is piped back to the processing center and into distillation towers. This part of the process yields 190 proof (95 percent by volume) ethanol. The remaining solids, called stillage, are what’s left of the corn once the starches and sugars, now converted to ethanol, have been removed.

Stillage is moved to the energy center where it’s dehydrated in large rotary kilns. The remaining pellets, called DDG, are rich in protein—ideal for boosting the protein content of animal feed. Augers and conveyors move the pellets into the DDG storage shed, adjacent to the loading/unloading shed, prior to loading in covered hoppers. A 100 million gallon per year plant ships 10 cars of ethanol and nine hoppers of DDGS pellets daily.

Unlike ethanol which is usually moved in large multi-car shipments or unit trains, covered hoppers of DDG typically move in smaller shipments to several feed producers. At many plants, the material moves in older 100-ton covered hoppers like Pullman-Standard 4427s or Evans 4780s.

On Your Layout

The Energy Center kit is an essential part of the North American Ethanol complex—it’s where the main co-product of ethanol, DDG, is produced. The kit includes a corrugated-metal main building with a canopied loading area for handling loose truck shipments, a stack, five process tanks and conveyor piping to connect the DDG storage shed from the Corn Unloading and Storage Sheds kit #933-2974, sold separately.

This structure kit is part of the North American Ethanol series. The rest of the kits in the series make it easy to simulate an entire ethanol plant, an industry that relies heavily on rail service. Inbound traffic includes covered hoppers of corn and tank cars of gasoline. Outbound loads include ethanol tank cars and covered hoppers of DDGS pellets. A steady flow of empty cars doubles the volume of cars, so plants often have their own switcher. The PROTO 2000® EMD SW1200 is ideal for your ethanol facility.

Cars serving the facility are easily modeled with Gold Line™ Evans 4780 Cubic Foot Covered Hoppers, Trinity 6351 4-Bay Covered Hoppers and Trinity 30,145-Gallon Tank Cars.

The Energy Center kit is also usable for other industries. With a little kitbashing, a floor grate added under the canopy allows it to be used for receiving clay for bricks at a modern brickworks, gypsum at a wallboard plant, waste materials at a recycling plant and more.
1. Glue base pieces (1, 2, 3, 4) together.

2. Glue conveyor (35, 36, 37) together. Then glue #37 to the inside of wall #8, in between the ridges.

3. Glue the walls (8, 9, 10, 11) together and to the base.

4. Glue the pit sides (5, 6, 7) in place on the base. Then glue the back wall (12) onto the top of #7 and the side of the building.
11. Glue three large tanks (19, 20, 21) together and then to the base (18). Note: Access hatch on #19 should be at bottom of tank.

12. Glue two of the small tanks (22, 23, 24) together and then to the base (18). Note: Access hatch on #22 should be at bottom of tank. Glue the agitators (25) into the holes in the tank tops.

13. Glue the straight pipe halves (26) together. Glue the elbows (27, 28) together. Glue the pads (31) onto the pipe supports (30). Glue these together in a way that suits your layout. Glue the wall plate (29) onto the end of a pipe that will go against a wall of the structure. Note: The plate has grooves on the back that will fit the corrugations on the wall.

5. Glue the trusses (13, 14) to the pit walls as shown. Note: Truss #14 has indentations on the bottom of the two vertical beams that will fit over the small pegs on the side wall.

6. Glue the roof joiner (17) underneath the two roof pieces (15, 16) thereby locking them together. Then glue the roof onto the structure.

7. Glue the roof pipe (32) together and to the roof.

8. Glue the ventilators (33) over the pads on the front wall.

9. Glue the downspouts (34) into the holes in the base as well as in the bottoms of the roof.

10. Glue the stack (38) together and to the base.
There are two options for applying signage to your structure. The first is by waterslide decals. This works well on smooth surfaces. Follow the instructions for “Decals” below. For the second option, useful on corrugated surfaces, follow the instructions for “Signs”.

DECALS
1. After cutting out the decal, dip in water for 10 seconds, remove and let stand for 1 minute. Slide decal onto surface, position and then blot off any excess water.
2. Lightly brush Micro Sol® on top. This will soften the decal, allowing it to conform to irregular surfaces. DO NOT TOUCH DECAL while wet!
3. When decal is thoroughly dry, check for any trapped air bubbles. Prick them with the point of a small pin or hobby knife blade and apply more Micro Sol®.

SIGNS
1. Carefully cut out sign, trimming as close as possible to the graphic. You will be using the paper backing as a sign board.
2. Apply white glue on the back of the sign and place in position on the wall.