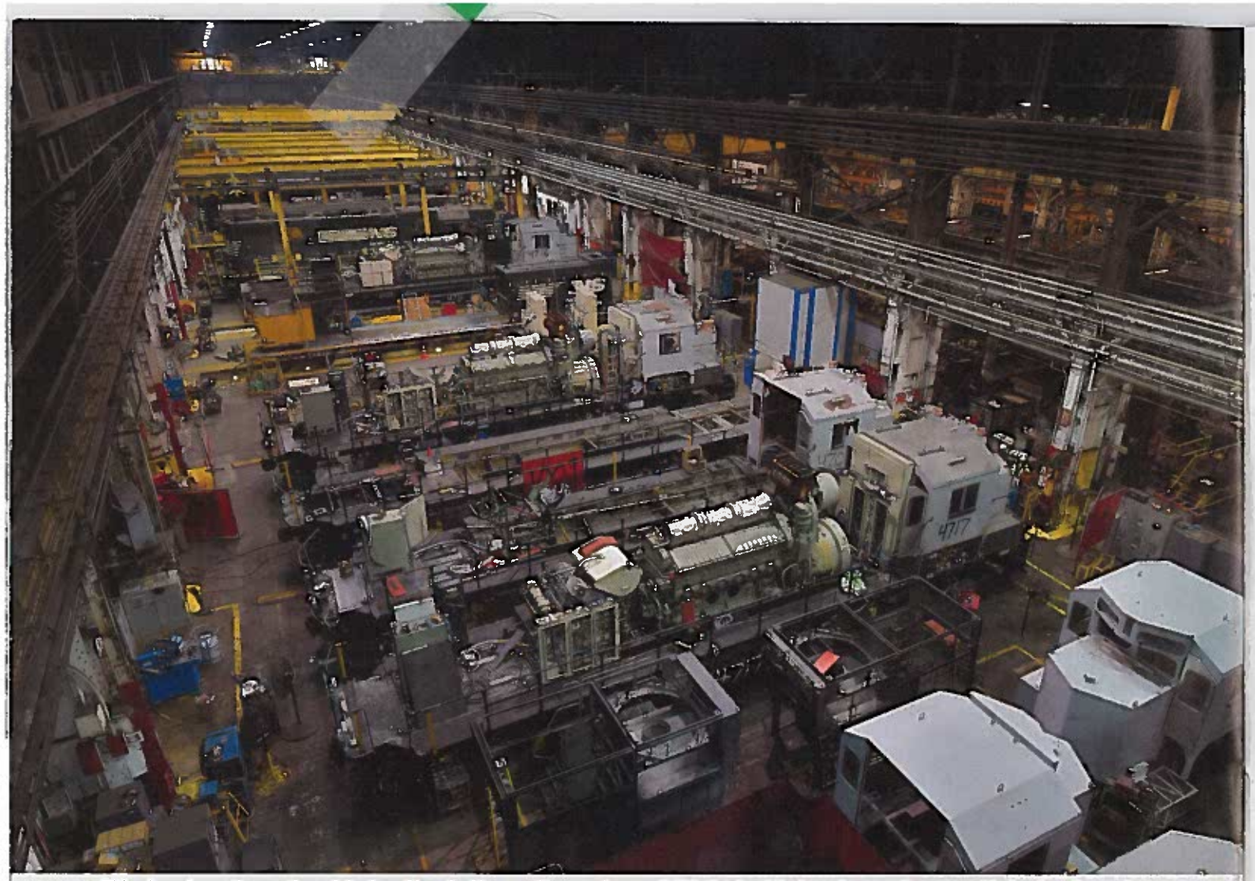

This view shows the portion of Juniata Shop in Altoona, Pa., workers call "Motherland," where locomotive assembly begins. Several GP33ECOs are in various phases. NS built all of its GP33ECOs in this shop, delivering them in 2015. Norfolk Southern: Casey Thomason

WORKERS MAKE MAGIC

happen every day at Norfolk Southern's shops in Altoona, Pa. Here's how they've remastered old locomotives into a new fleet of fuel-efficient, environmentally friendly switchers now in service in Illinois and Georgia. Typically, railroads use older locomotives for yard service, with all the inefficiencies and pollution issues that come with such equipment. Norfolk Southern is upending that practice, taking advantage of government funding and the skilled workforce at its Altoona shops to create a new fleet of 26 GP33ECO rebuilds — 13 of them paired with slugs for low-speed tractive effort — which are now at work in Chicago, Atlanta, and Rome, Ga. They are the vanguard of a project that will continue in 2016 as NS works with government agencies to address emissions issues.

The genesis of the project is the Clean Air Act Amendment passed in 1990, and the subsequent Congestion Mitigation and Air Quality Improvement Program, part of 1991's Intermodal Surface Transportation Efficiency Act. The program supports surface transportation projects that improve air quality and relieve congestion by providing funding to states to help metropolitan areas attain and maintain National Ambient Air Quality Standards.

Members of NS's locomotive engineering and government relations departments look for potential funding using air quality grants that would address emission reductions in cities the railroad serves. The grants can offset the cost of replacing or upgrading older locomotives, which comply with the least restrictive set of emission standards, Tier 0 or Tier 0+.

For years, Norfolk Southern explored public funding opportunities to finance a small number of locomotives with enhanced Tier 2 emissions before receiving a grant from the Chicago Metropolitan Agency for Planning to partially finance four Tier 2 gensets for the Chicago Terminal. The agency reviews competing proposals and essentially ranks them based on the most efficient reduction in emissions on a per-dollar basis.

Because railroads are for-profit corporations, federal rules require a government agency to sponsor such projects. The federal government covers approximately 65 percent of the cost, with Norfolk Southern covering the other 35 percent. In Illinois, NS's sponsor was the state Environmental Protection Agency, and since the project funds come from the federal highway bill, the Illinois Department of Transportation administered funding.

During the contract negotiations, Norfolk Southern determined from its experience with eight gensets working elsewhere that those were not the best locomotive option for Chicago. So it made a formal request to use the funding to finance three GP22ECO locomotives, using EMD's 8-710 ECO engine with comparable Tier 2 emissions, along with three slugs that would mate with the GP22ECOs. Although this would result in one less powered locomotive, Norfolk Southern illustrated that three mother-slug sets produced more tractive effort at lower speeds than four comparable gensets. During the initial grant period in early 2013, another grant request was made and approved adding 12 additional GP22ECOs, allowing Norfolk Southern to replace all existing Chicago-based locomotives with Tier 2 emission-equipped engines. At the time, EMD did not have a Tier 3 repower offering.

During the initial award period, Norfolk Southern was notified by EMD that it had a 12-710 ECO engine, which is capable of achieving emissions compliance up to Tier 3 standards. The engine change would require a funding increase request, but meant the Chicago-based locomotives would achieve cleaner emissions. It also meant the horsepower output from each mother would increase from 2,000 to 3,000, which is more desirable for a mother locomotive. The new units thereby became GP33ECOs. In addition, the change would allow Norfolk Southern to add more slugs rather than powered locomotives as the demand for yard and local power increases. This was approved and the fleet was set at 15 GP33ECOs and three slugs.

While negotiating in Chicago, Norfolk Southern held similar discussions to secure funding to replace engines in Atlanta. State and local officials there also looked at using gensets, but as in Chicago, NS was able to provide compelling data to use ECO rebuilds, and funding was approved for 10 GP33ECOs and 10 slugs. Shortly thereafter, NS identified a funding opportunity in Rome, Ga., and was able to add another GP33ECO and slug to the 25 mothers and 13 slugs already approved. The Georgia Department of Natural Resources' Environmental Protection Division awarded the funding for the locomotives in Atlanta and Rome.

While funded through three separate initiatives, the close proximity of the Chicago, Atlanta, and Rome awards allowed the railroad to construct all three groups of locomotives simultaneously. While EMD had previously constructed GP22ECOs and was currently offering a GP33ECO rebuild, NS decided to build these locomotives in-house with EMD ECO components.

Norfolk Southern job BC06, led by No. 4702, switches Continental Paper Grading at 18th Street on the near South Side of Chicago on Sept. 16, 2015. Marshall Beecher

NORFOLK SOUTHERN GP33ECO ROSTER// 4700-4714 CHICAGO; 4715-4724 ATLANTA; 4725 ROME

RP-M4C SLUGS ASSIGNED TO GP33ECOS// NS 645-647 CHICAGO; NS 648-657 ATLANTA; NS 658 ROME