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GAS TURBINE MARKETS

- **Utility and Industrial Power Generation**
- **Industrial Power Generation**
- **Oil & Gas Industry**

INDUSTRIAL AND PROCESSING FACILITIES

- Chemicals
- Pharmaceuticals
- Foods and Ingredients
- Dairies and Dairy Products
- Beverages
- Breweries
- Grain Processors
- Ceramics
- Cement / Gypsum
- Paper / Wood Products
- Plastics
- Tires / Rubber Products
- Refineries
- Manufacturing

BUILDINGS AND INSTITUTIONS

- District Heating and Cooling Plants
- Universities
- Hospitals
- Resorts and Hotels
- Commercial Buildings
- Telecommunications Complexes
- Computer Centers

OIL AND GAS APPLICATIONS

- Gas Transmission
- Storage and Withdrawal
- Waterflooding
- Gas Gathering
- Gas Lift
- Field Pressure Maintenance
- Air, Process, and Refrigeration Applications
- Electrical Power Generation

POWER GENERATION APPLICATIONS

- Large and Small Utilities
- Cogeneration
- Standby Power
- Peaking Power
- Power Generation for Industrial and Processing Facilities
- Areas with Rapid Demand Growth
- Mobile Power
- Remote Locations
- Load Management

The Rise of Natural Gas for Electricity Generation

Sources: EIA and Industry Reports;

Blackouts in England and New York City create interest in using natural gas turbines as backup generators. Combined-cycle technology makes gas turbines more efficient

Powerplant and Industrial Fuel Use Act of 1978 (PIFUA) prohibits use of natural gas in new power plants

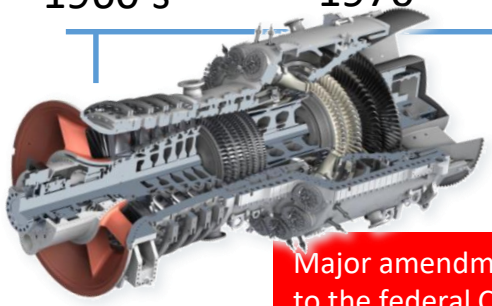
Natural gas price drops by more than half from 1983-1994

1990: Clean Air Act amendments add additional rules for power plants

2005-2014: New natural gas drilling technology, including "fracking,", increases U.S. natural gas production more than 40% in 10 years

April 2015
For the first time, natural gas produces more power than coal in

1960's 1970 1980 1990 2000 2010



Major amendments to the federal Clean Air Act pave the way for environmental controls, raising the cost and complexity of coal-fired power plants

1987: PIFUA repealed

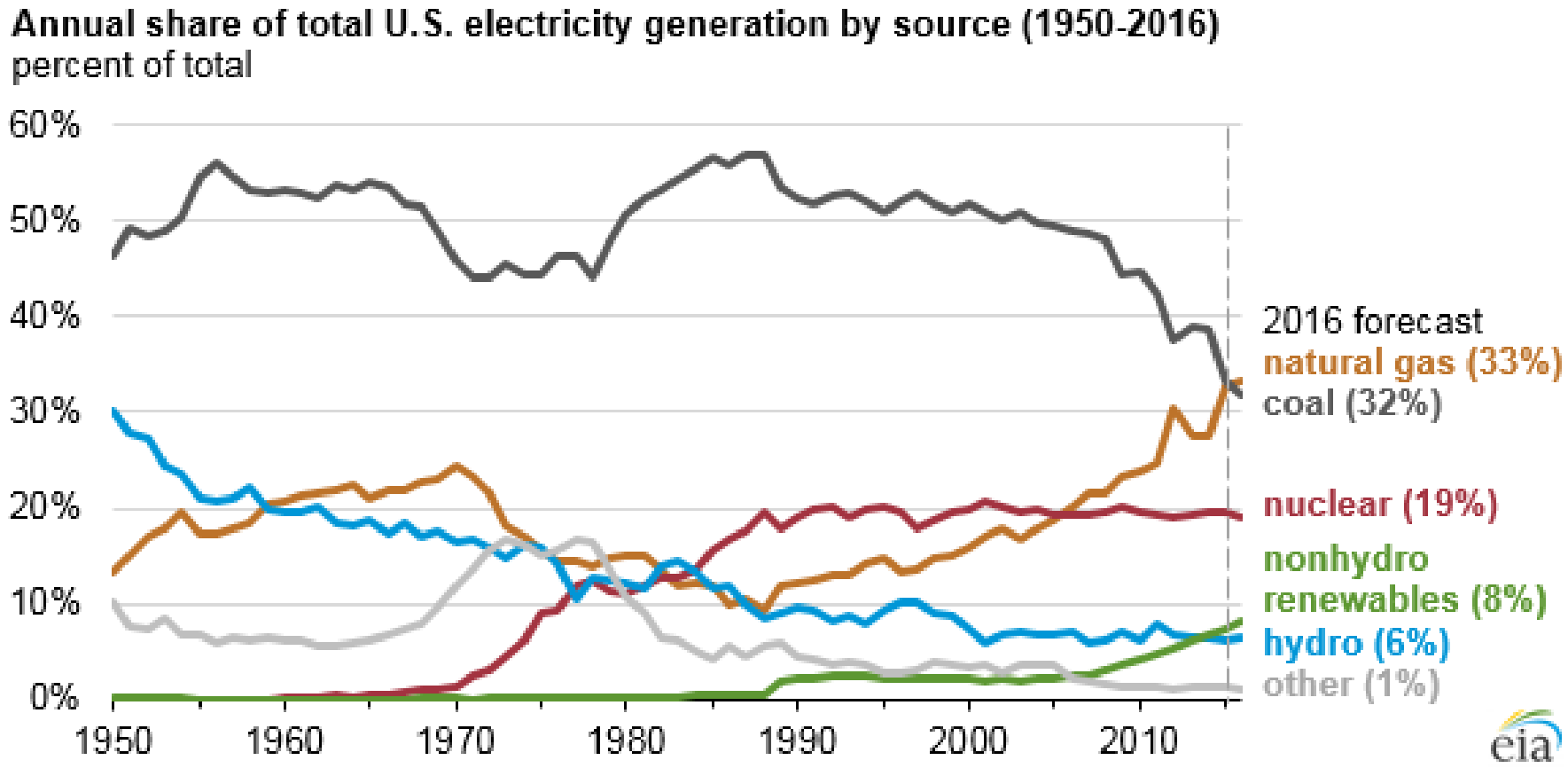
1985: Coal generates 57% of the power in the U.S.

1990's: steps taken at the federal and state levels to loosen regulations on electric utility markets. Non-traditional power producers begin building generation capacity, almost all of it burning natural gas

2000-2002: Electric generation capacity increases nearly 20%, almost all of it from new natural gas turbines

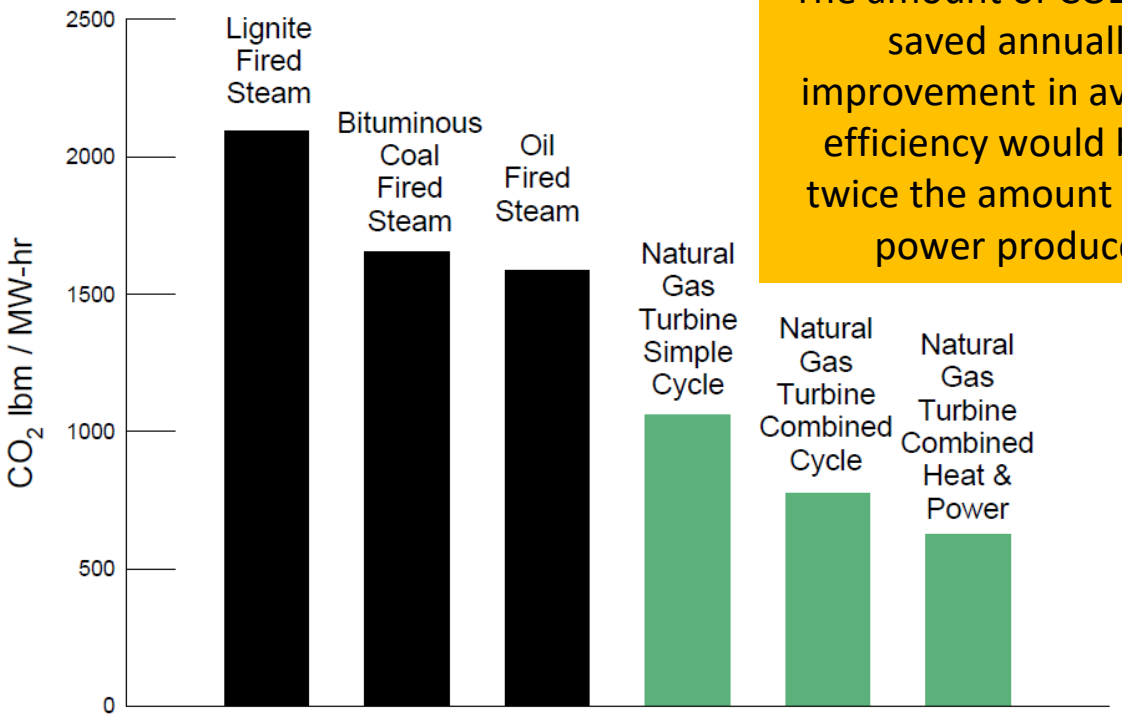
August 2015: EPA announces its Clean Power Plan calling for natural gas to produce 33% of the nation's electricity by 2030, and coal 27%

Natural gas expected to surpass coal in mix of fuel used for U.S. power generation in 2016



Gas Turbines: Cleaner use of fossil fuel

CO2 Creation

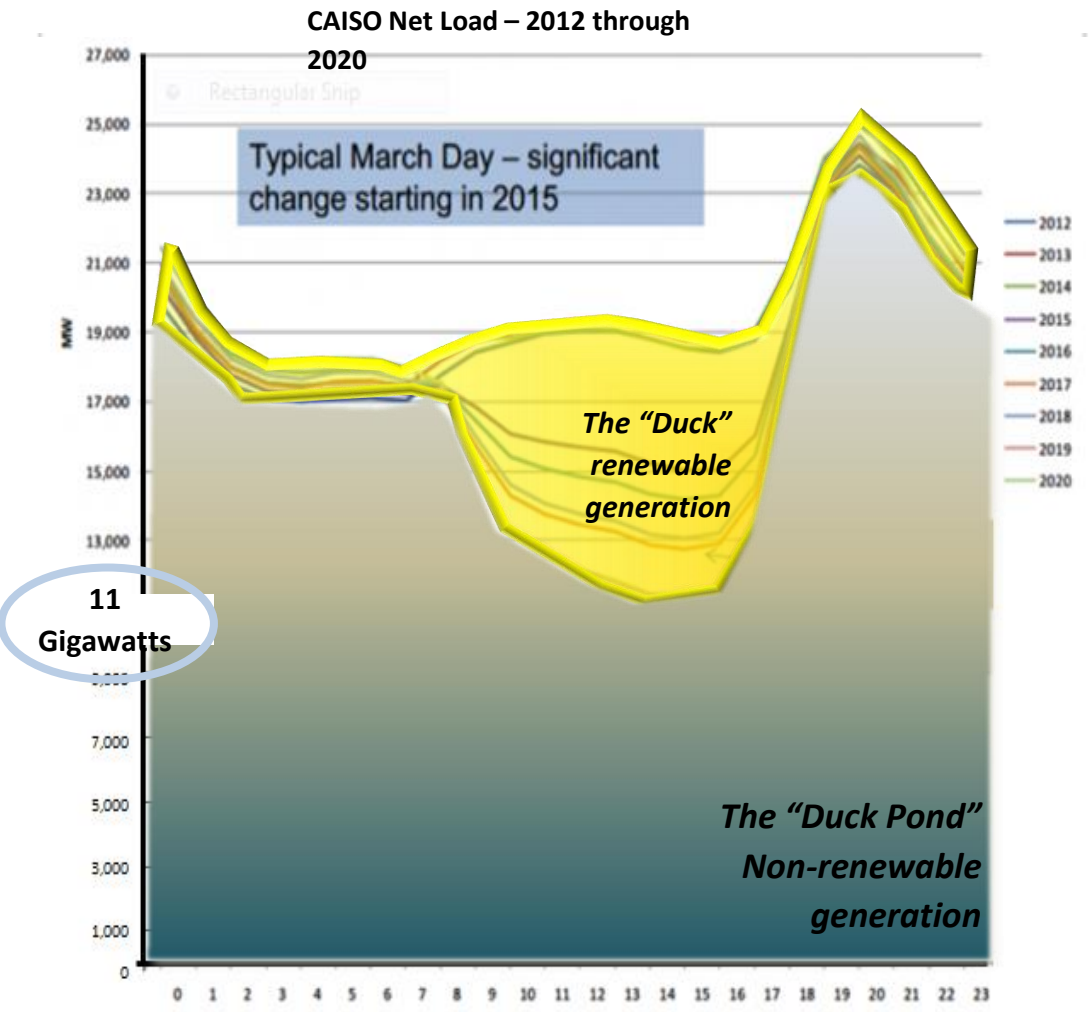


Fun Fact

The amount of CO2 that would be saved annually by a 1% improvement in average GT fleet efficiency would be more than twice the amount saved by solar power produced in 2014

High Thermodynamic Efficiency + Low Carbon Fuel = Low CO_2 Emissions

Power Generation on Grids with renewables



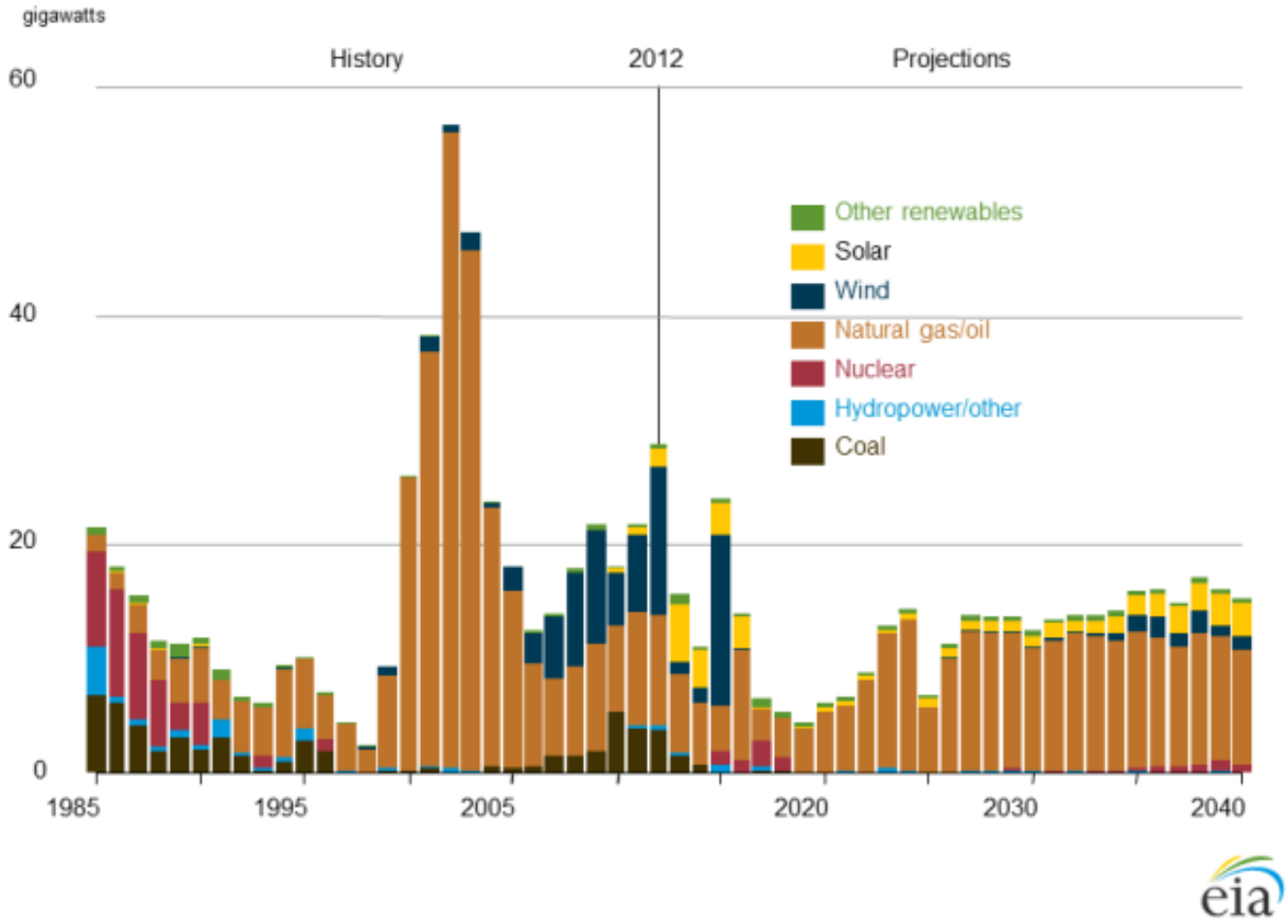
Lots of ***non-renewable generation is operating all of the time***

The non-renewables remain more environmentally influential than the renewable generation

Generating Capacity Additions

Reference Case through 2040

Figure MT-32. Additions to electricity generating capacity in the Reference case, 1985-2040



Congressional Briefing on Advanced Gas Turbine Technologies and Manufacturing

SIEMENS
Ingenuity for life

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