

Steam Plant Conversion

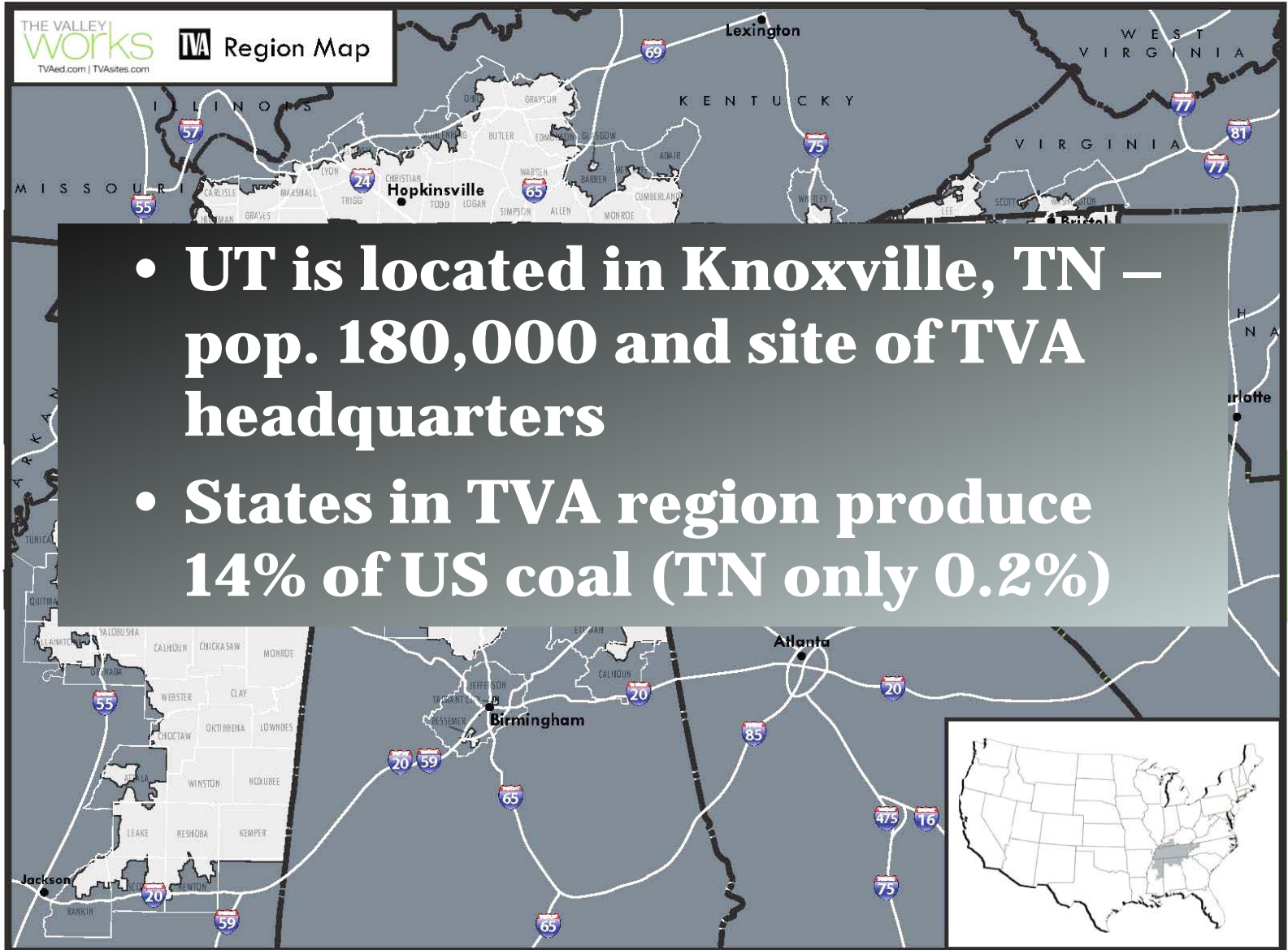
Eliminating Campus Coal Use
at the Steam Plant

University of Tennessee, Knoxville



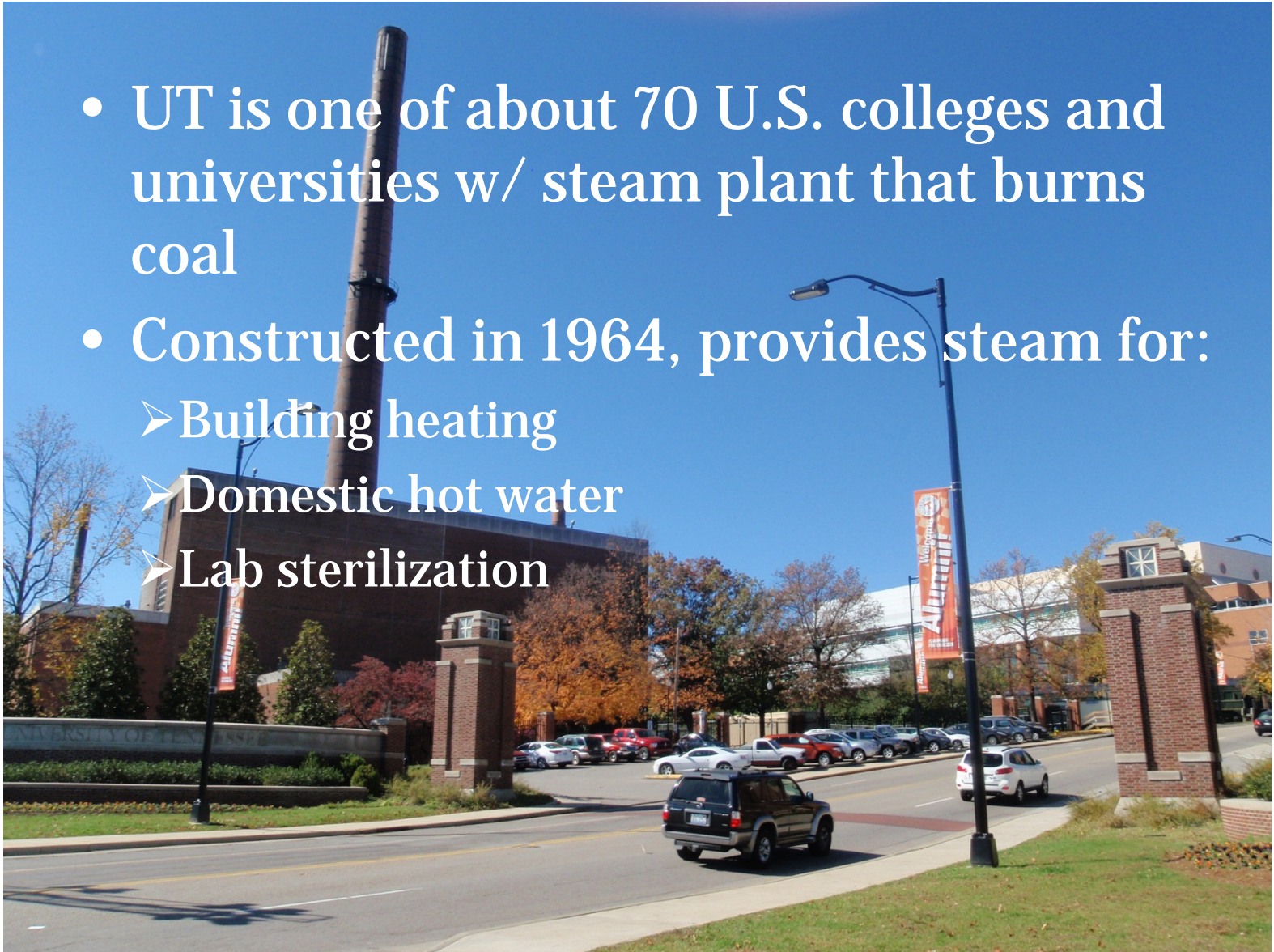
- Flagship campus of the University of Tennessee
- TN's land grant university
- 24,400 FTE students and 6,600 FTE staff as of fall 2011
- 560 acres and 14.9 million GSF building space
- Signed ACUPCC in 2007

Knoxville and the TN Valley



UT's Steam Plant

- UT is one of about 70 U.S. colleges and universities w/ steam plant that burns coal
- Constructed in 1964, provides steam for:
 - Building heating
 - Domestic hot water
 - Lab sterilization



UT's Steam Plant

- Powered by 5 boilers:
 - 2 coalfired
 - 1 NGfired (installed in late 1990s)
 - 1 fired w/ coal, fuel oil #2, or NG
 - 1 fired w/ NG or fuel oil #2 (installed in 2011)
- Historically, UT's choice of fuel has been driven by coal and NG prices
- Peak coal use: 35,000 tons; dropped to 6,700 tons in 2011-12
- Current emissions ~ 90,000 MTCDE
 - Equivalent to CO2 emissions from annual energy use of 7,792 homes

• Sources: Sourcewatch. 'Existing campus coal plants.'; EPA Greenhouse Gas Equivalencies Calculator.

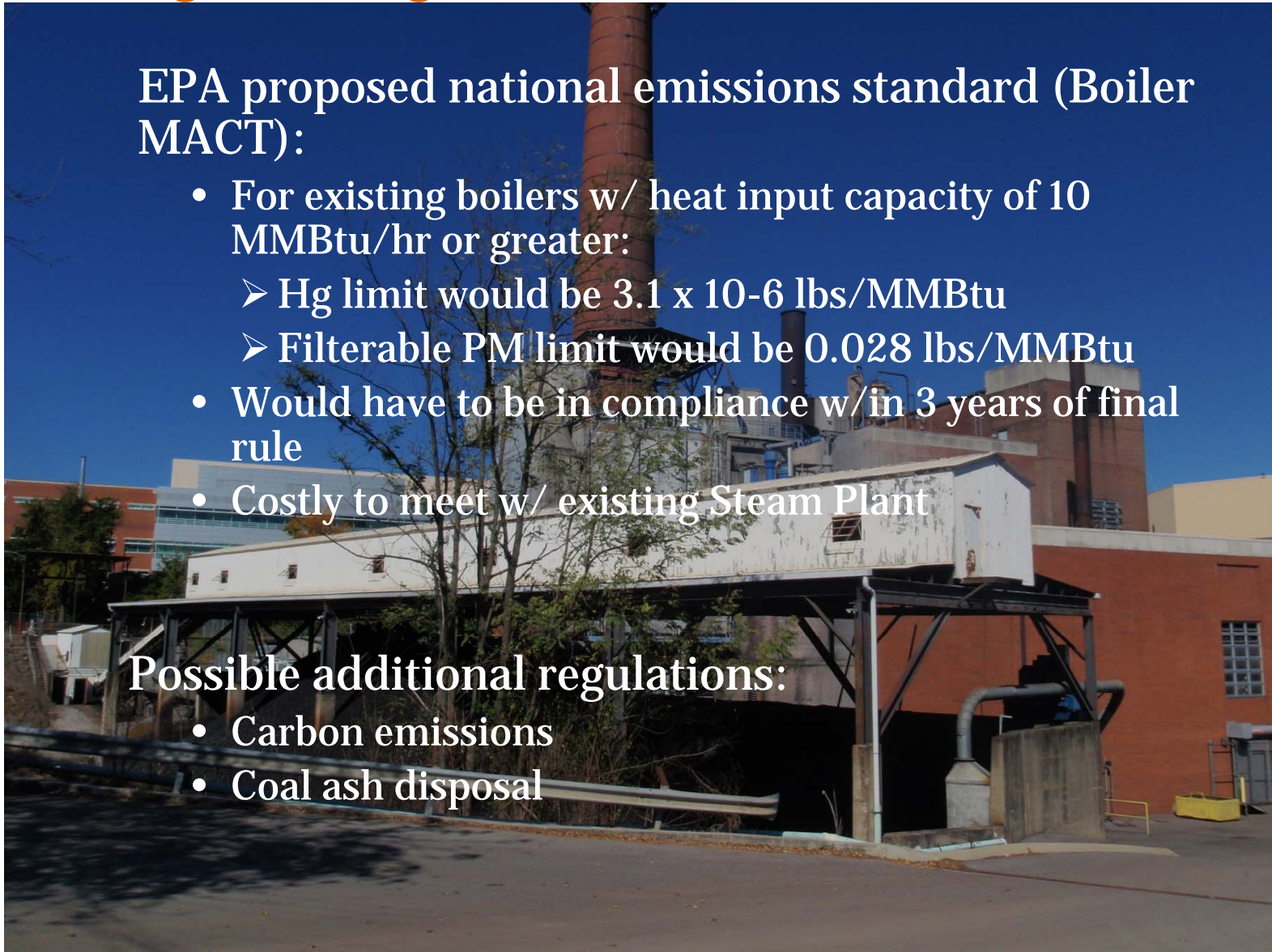
Challenges of Using Coal

EPA proposed national emissions standard (Boiler MACT):

- For existing boilers w/ heat input capacity of 10 MMBtu/hr or greater:
 - Hg limit would be 3.1×10^{-6} lbs/MMBtu
 - Filterable PM limit would be 0.028 lbs/MMBtu
- Would have to be in compliance w/in 3 years of final rule
- Costly to meet w/ existing Steam Plant

Possible additional regulations:

- Carbon emissions
- Coal ash disposal



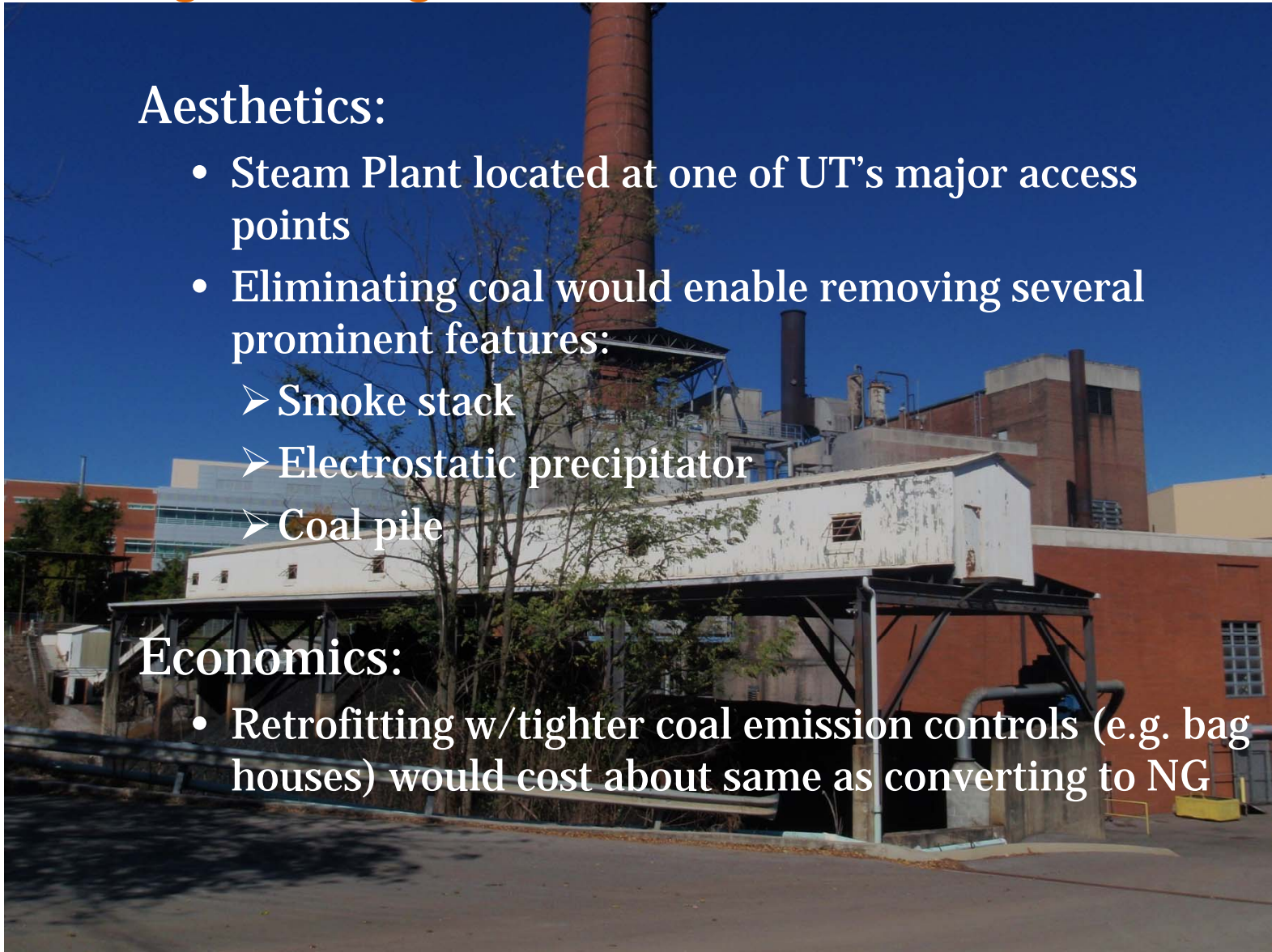
Challenges of Using Coal

Aesthetics:

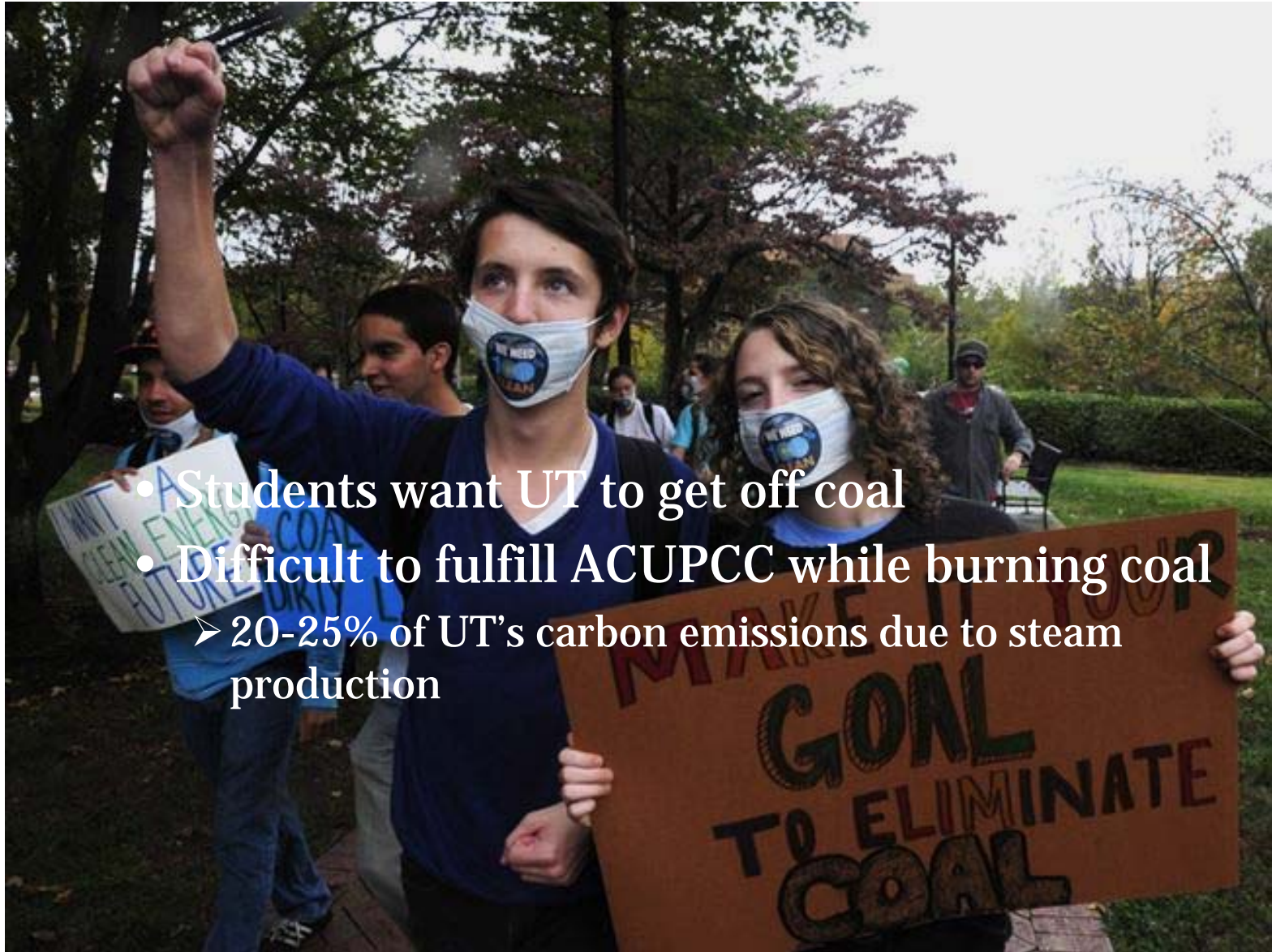
- Steam Plant located at one of UT's major access points
- Eliminating coal would enable removing several prominent features:
 - Smoke stack
 - Electrostatic precipitator
 - Coal pile

Economics:

- Retrofitting w/tighter coal emission controls (e.g. bag houses) would cost about same as converting to NG



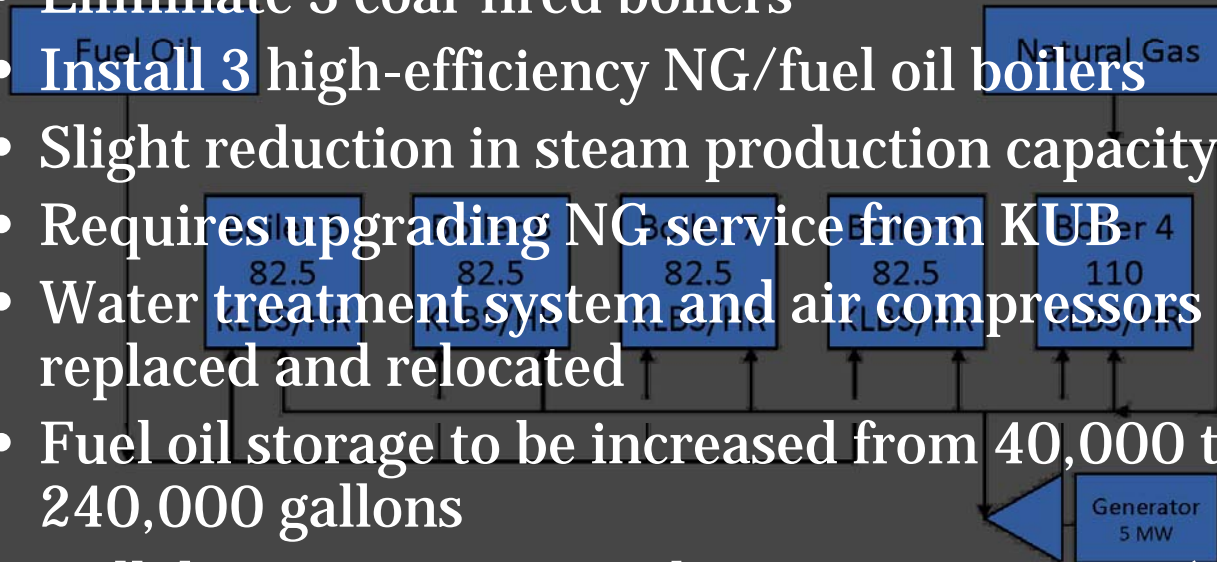
Other concerns



- Students want UT to get off coal
- Difficult to fulfill ACUPCC while burning coal
 - 20-25% of UT's carbon emissions due to steam production

Steam Plant Conversion

- UT has decided to eliminate coal use at Steam Plant
- Self-funded \$25 million project, target completion: 2016
- Eliminate 3 coal-fired boilers
- **Install 3 high-efficiency NG/fuel oil boilers**
- Slight reduction in steam production capacity
- **Requires upgrading NG service from KUB**
- **Water treatment system and air compressors to be replaced and relocated**
- Fuel oil storage to be increased from 40,000 to 240,000 gallons
- Will decrease emissions by 39,000 MTCDE (43%)
 - Environmental benefit would be like taking 3,300 homes 'off-grid' for a year!



Additional Comments

- Coordinating boiler replacements will take years not months
- Steam Plant conversion will not result in layoffs
 - Employees to be retrained on new equipment
- Facilities Services took care to inform small coal suppliers about the conversion prior to this info going public

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