Natural Gas: Environmental Issues

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EDF
ENVIRONMENTAL DEFENSE FUND®
Finding the ways that work

About Environmental Defense Fund

- Founded in 1967, EDF tackles the most serious environmental problems with:
  - A commitment to sound science
  - Efficient, market-based solutions
  - The power of unlikely partnerships
  - Smart, non-partisan policy
- EDF has more than 350 scientists, economists, attorneys and other professionals on staff
- Not-for-profit, non-partisan advocacy group
- Offices in US, China, Mexico; work closely with partners in Brazil, India, EU, and several other locations

Natural gas offers clear up-sides…

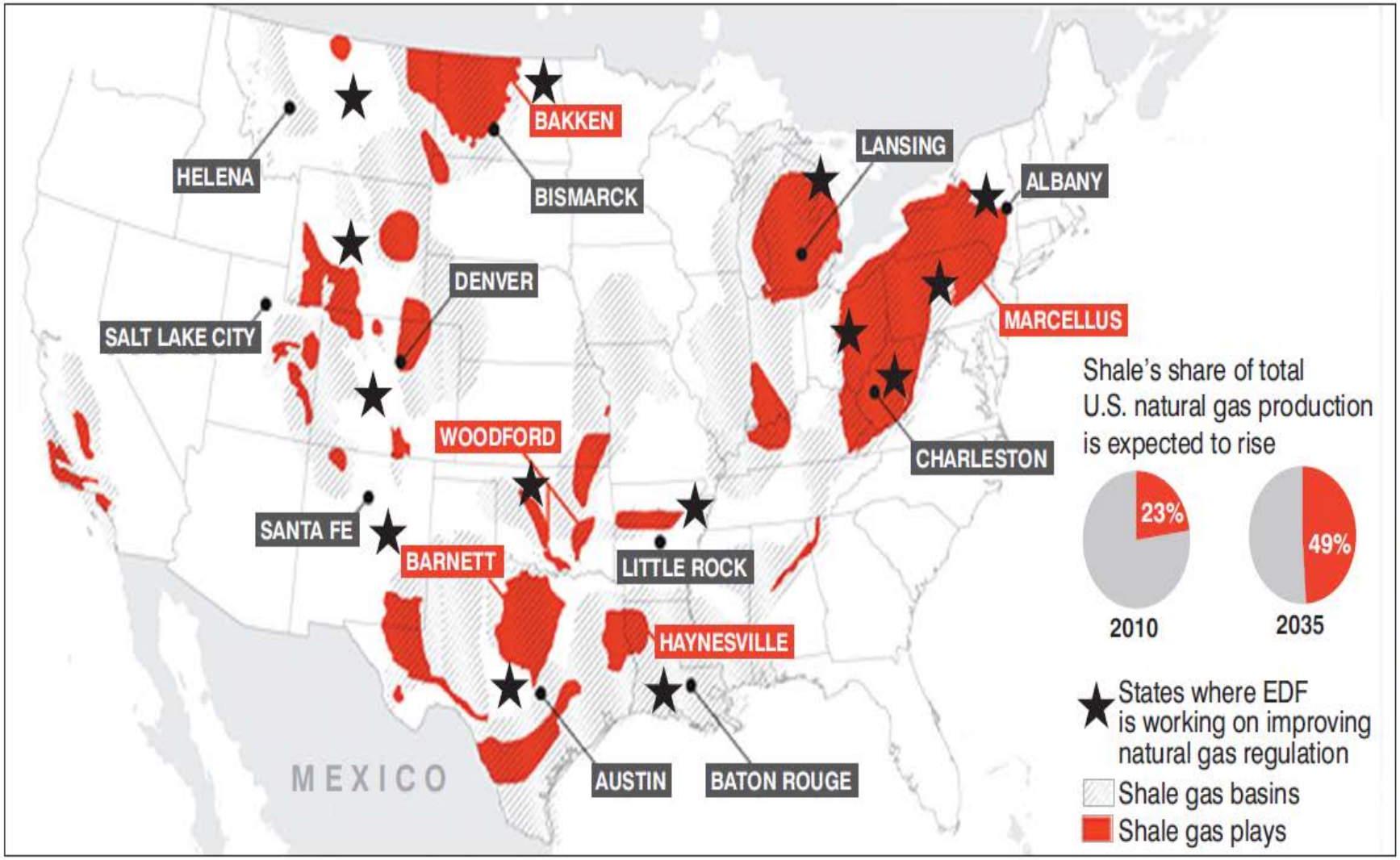
Economic development

Increased energy security

Less air pollution upon combustion

…If done the “right way”

THE UNITED STATES OF SHALE GAS



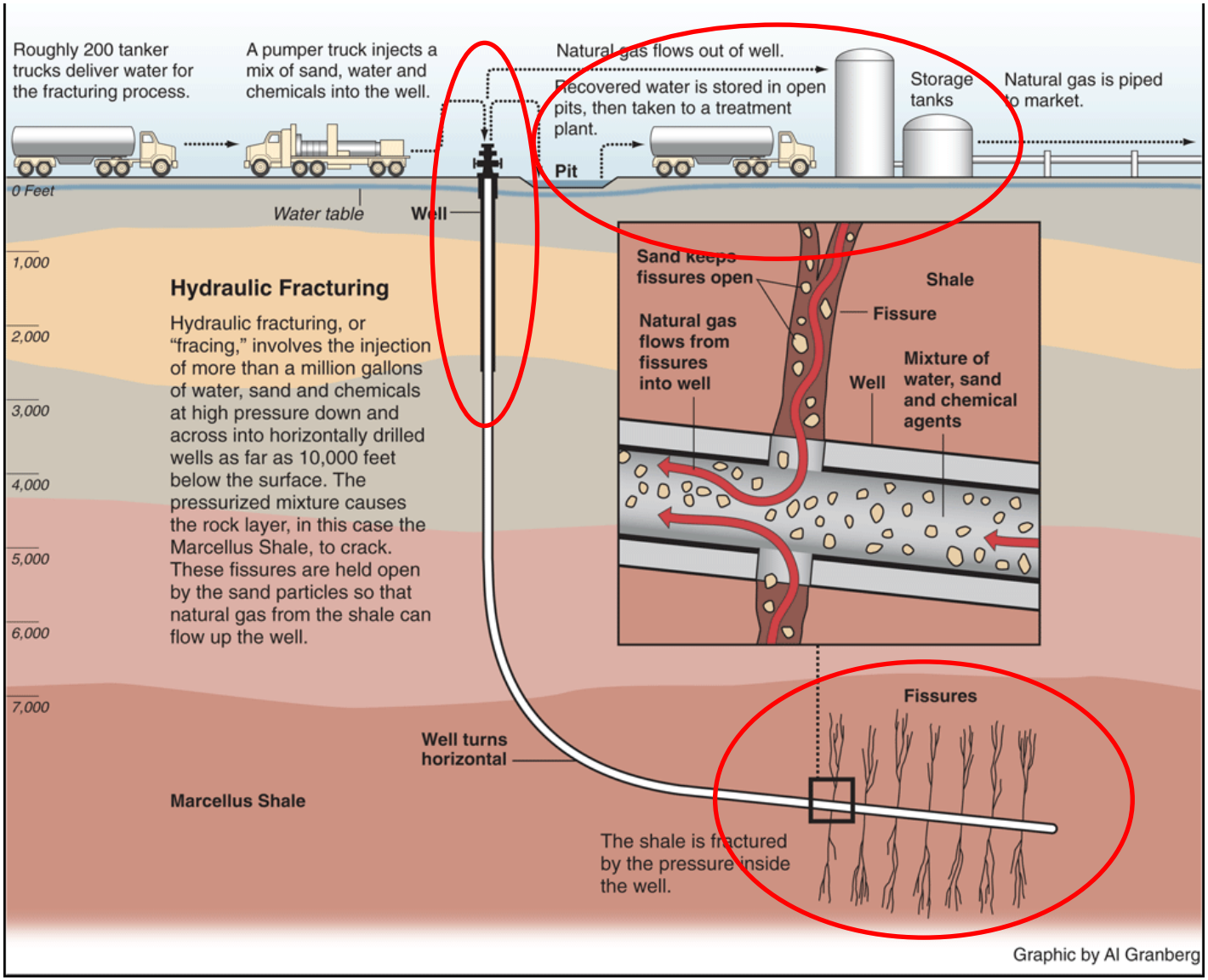
Sources: U.S. Energy Information Administration, IHS

...and potential risks if not done correctly

- Increased greenhouse gas emissions
- Air emissions
- Hydraulic fracturing
  - Well Construction
  - Sensitive areas
- Fluids and Solid Waste
  - Frac Fluid disclosure
  - Sourcing and Quantity of Water
  - Produced Water: what to do with it?
  - Spill prevention throughout
- Infrastructure: roads, traffic, pipelines, etc.
- Nuisance” Issues: Noise, Dust

Social license to operate depends on getting it right

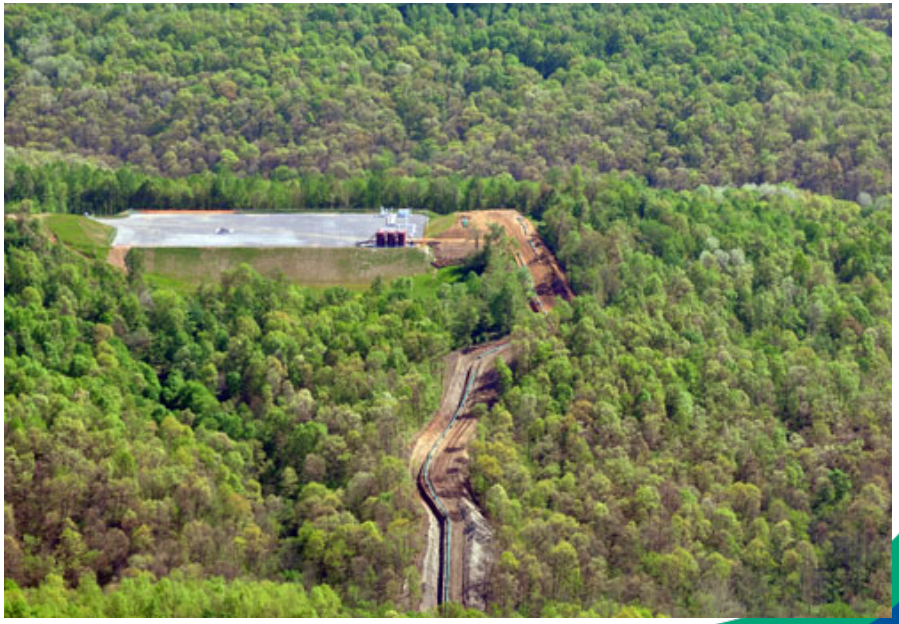
Where the issues really are



Impacts to people and environment

The image is courtesy of Prof. Nathan Philips at Boston University

Impacts to people and environment

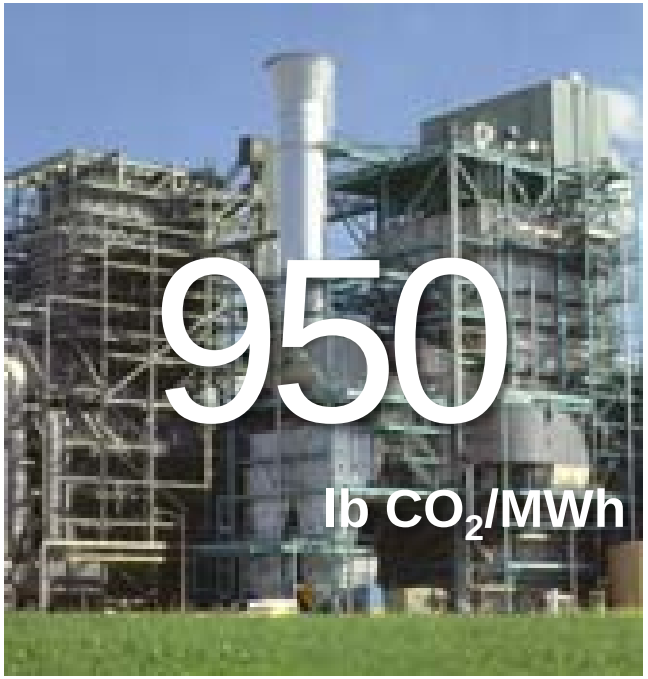


Emissions a reality….but the magnitude is uncertain

Source: TCEQ

Power plant CO_2 emissions…

Coal



Natural Gas

Power plant emissions…aren't whole story

COAL MINING
& PROCESSING

TRANSPORTATION

COAL
COMBUSTION

NATURAL GAS
PRODUCTION

PROCESSING

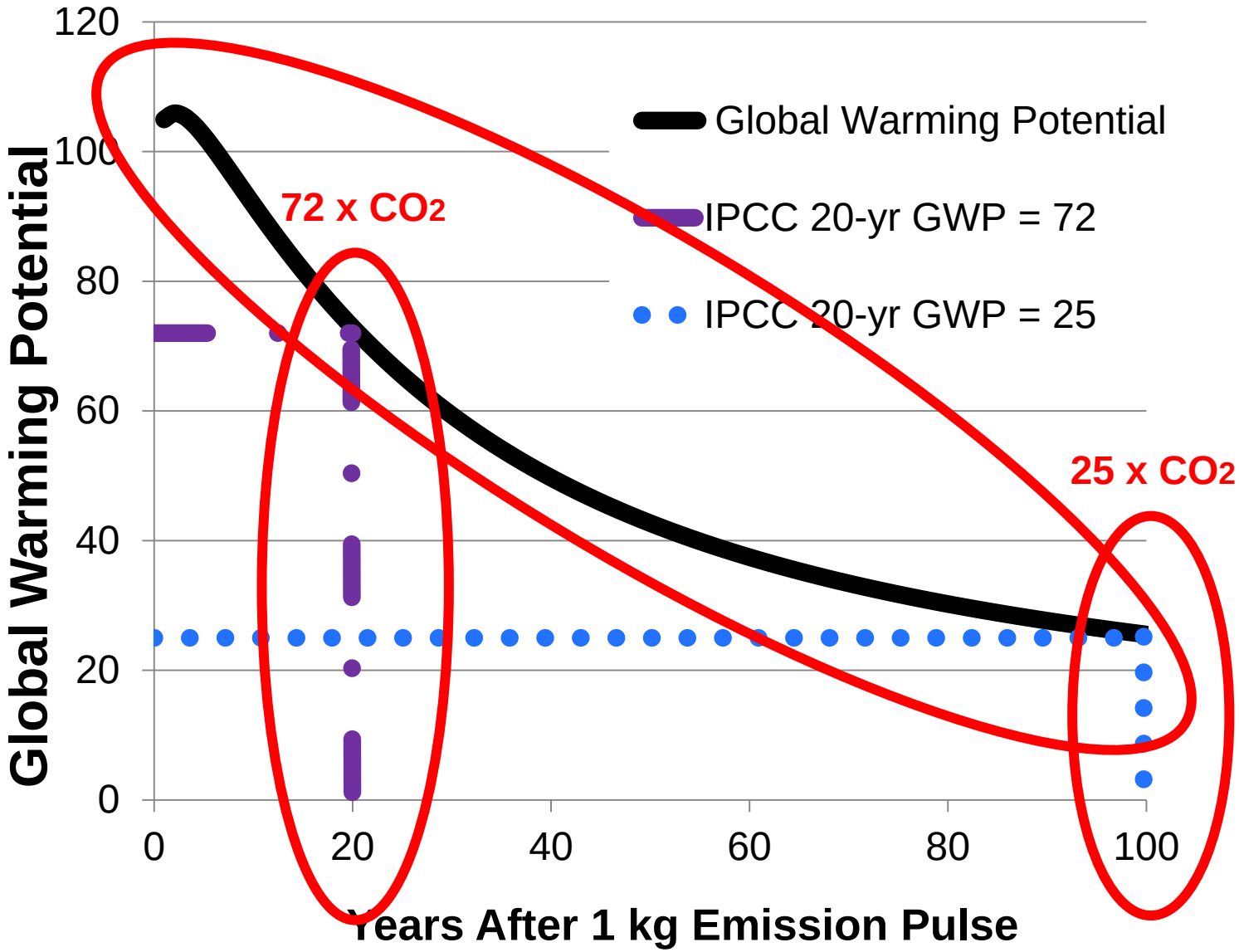
TRANSMISSION
& STORAGE

NATURAL GAS
COMBUSTION

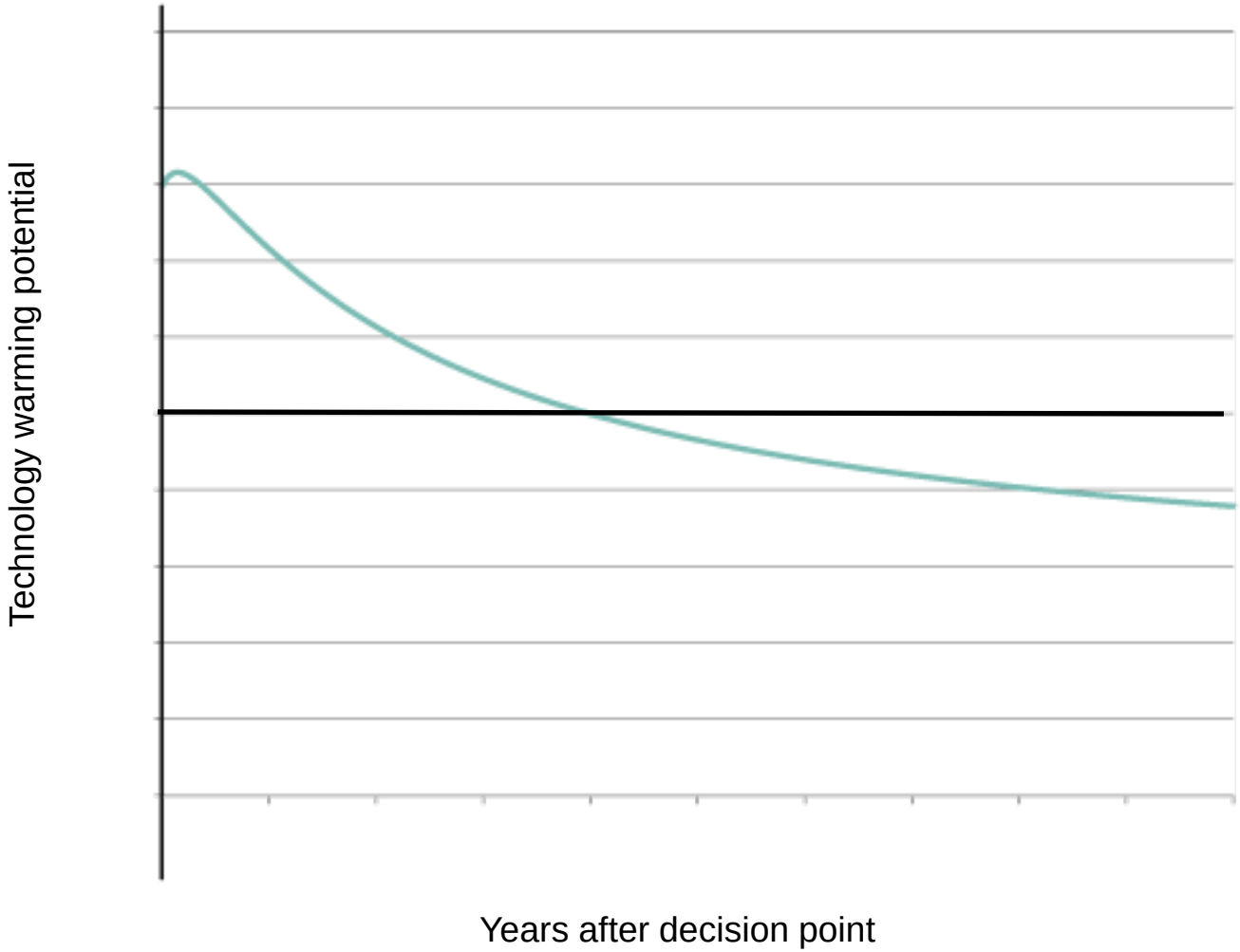
LOCAL DISTRIBUTION
TO OTHER END USERS

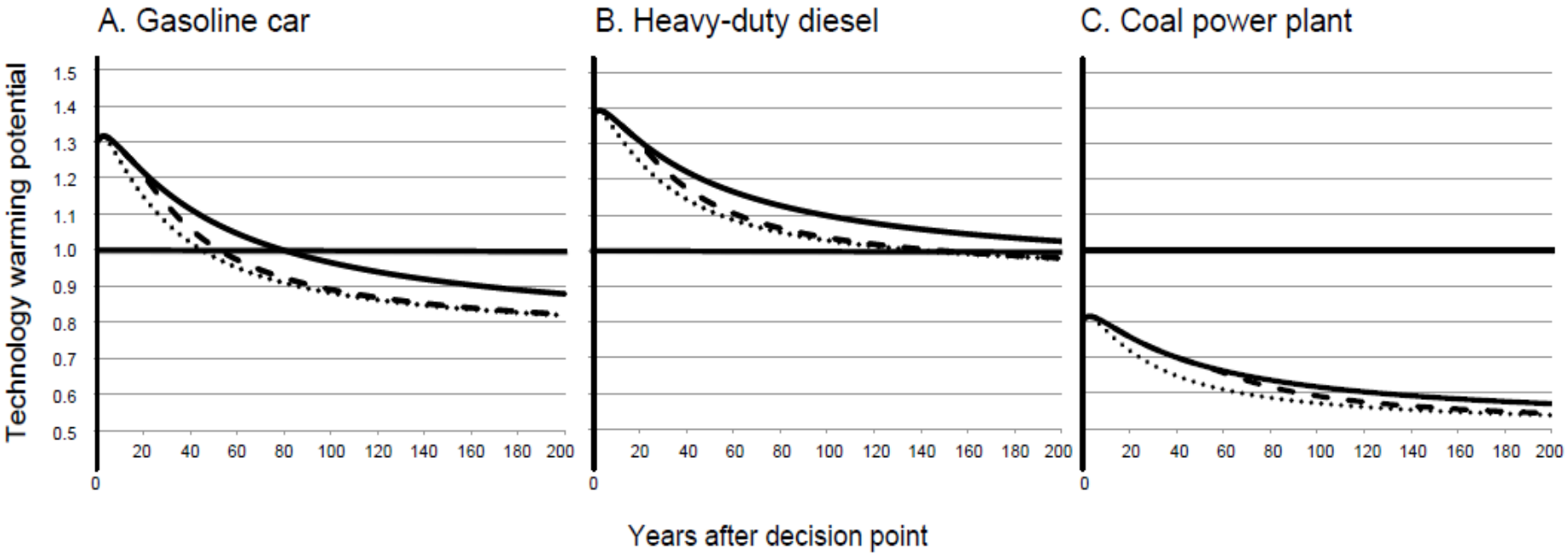
Source: Adapted from Jaramillo et al., (2007) EST 41, 6290

Methane: significant climate accelerant

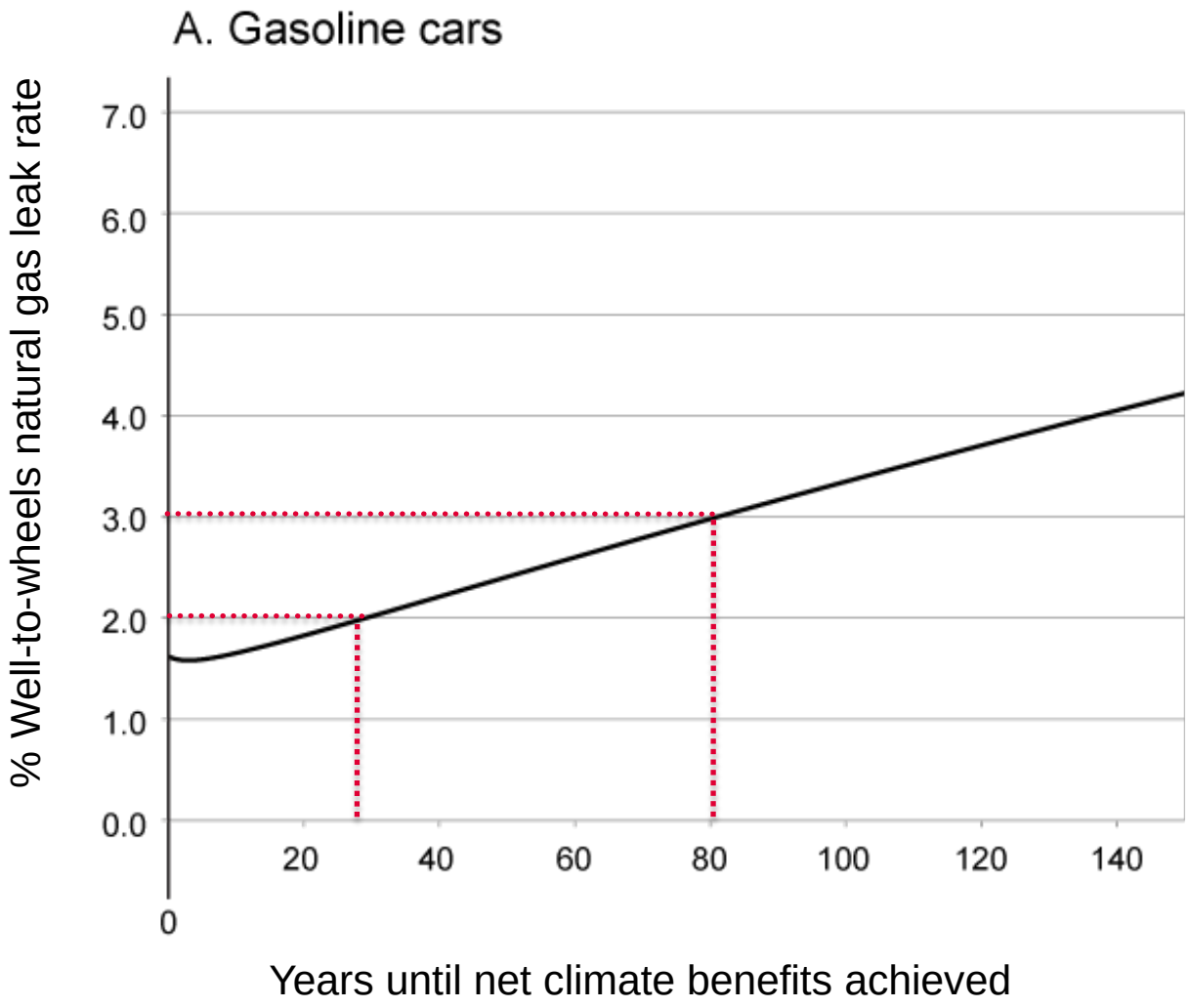


Technology Warming Potential: Natural Gas vs Gasoline

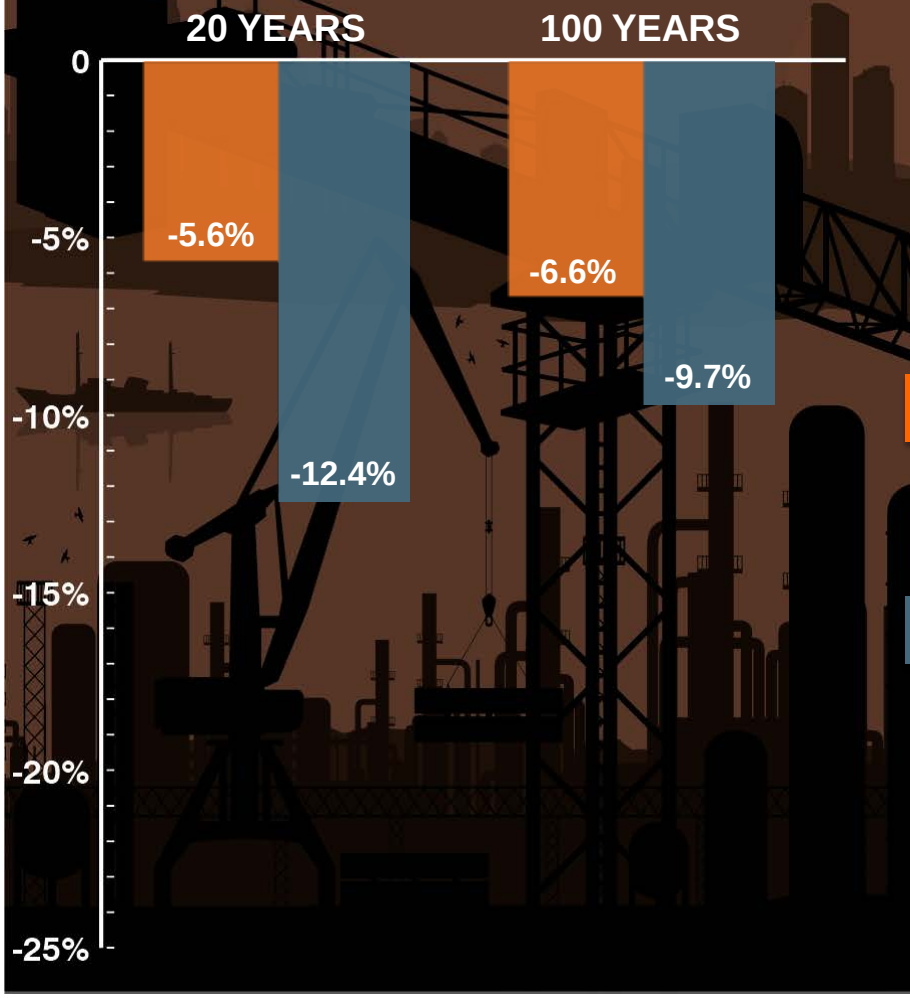



A. Gasoline car
B. Heavy-duty diesel
C. Coal power plant
Technology warming potential
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0
20
40
60
80
100
120
140
160
180
200
Years after decision point

Leak rate affects time to climate benefits



U.S. contribution to net radiative forcing



FUEL MIX
40% reduction in coal
2/3 to nat gas and 1/3 to zero emitting fuels

BASELINE
No leak rate reduction (2.8%)

POLICY
leak rate reduction from 2.8% to 1%

Cutting CH_4 leakage from 2.8% down to 1% produces more than twice the climate benefit in the short term as closing down 40% of the nation's coal plants and replacing with natural gas zero-emissions sources; significant benefits persist beyond 100 years.

Field Study of U.S. Gas Production Methane Emissions - Participants

University of Texas at Austin (lead)

Environmental Defense Fund

Environmental testing firms: URS and Aerodyne Research

Bringing together nine leading U.S. natural gas producers:

-- Anadarko Petroleum Corporation
-- BG Group plc
-- Chevron
-- Encana Oil & Gas (USA) Inc
-- Pioneer Natural Resources Company
-- Shell
-- Southwestern Energy
-- Talisman Energy USA and
-- XTO Energy, an ExxonMobil subsidiary.

Key Focus of the Study

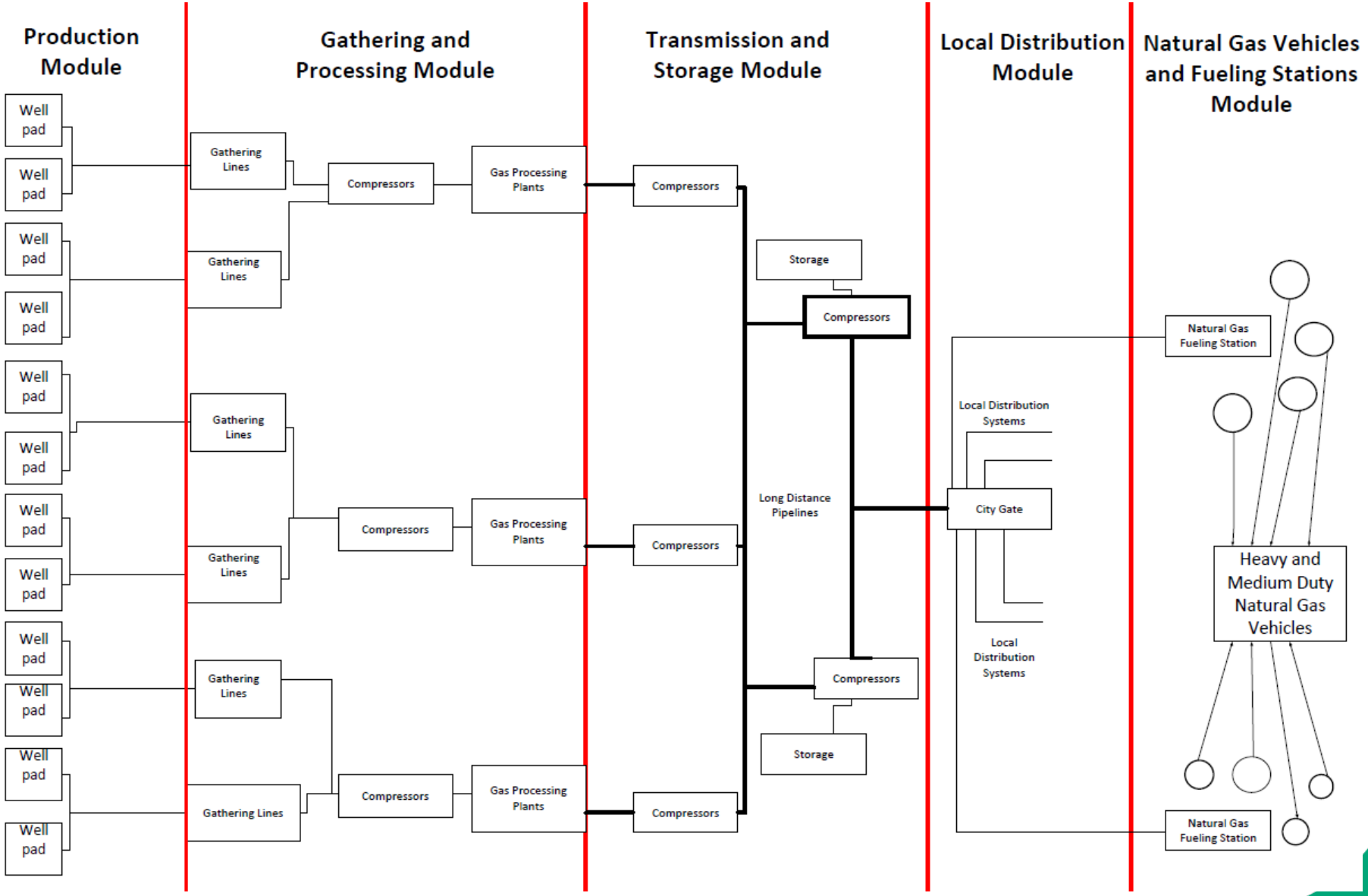
Quantifying Emissions from:

- Well completions
- Gas well liquid unloading and well workovers
- In addition to other routine well-site fugitive emissions
- 5 module study (including stand-alone “pump to wheels” assessment of heavy duty natural gas vehicles)

Scientific Advisory Panel

- Results to be published in peer-reviewed journal
- Available to public

Methane Emissions Field Studies



Conclusions

Mandatory chemical disclosure

Modernized well construction and operation rules

Improved waste and water management

Strong air emission standards including minimum CH_4 leakage

Minimized community and land impacts

Need for better data

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