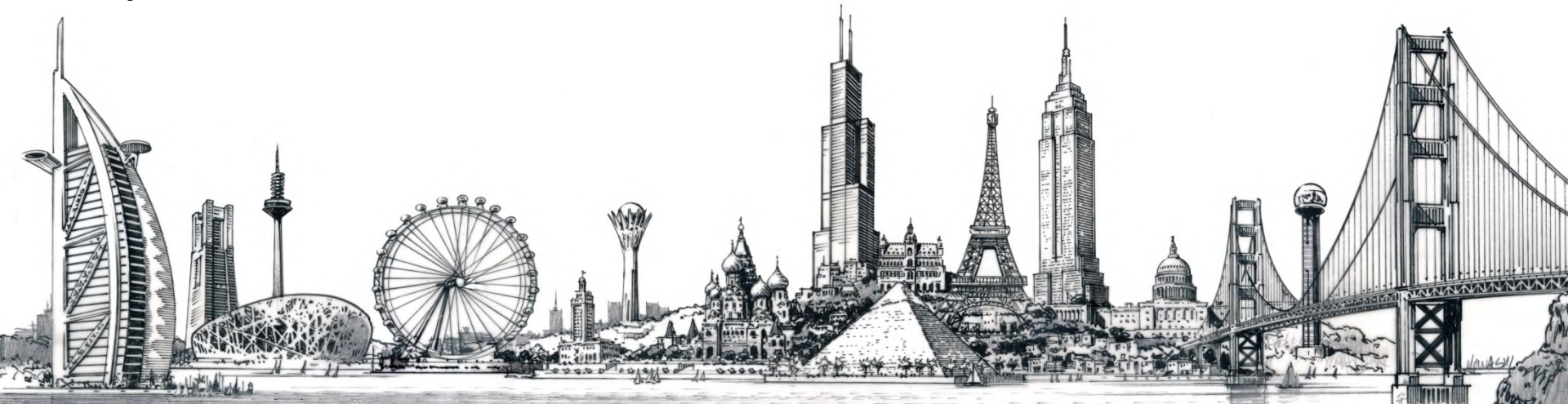


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EPA'S CLEAN POWER PLAN: OPPORTUNITIES AND EFFECTS

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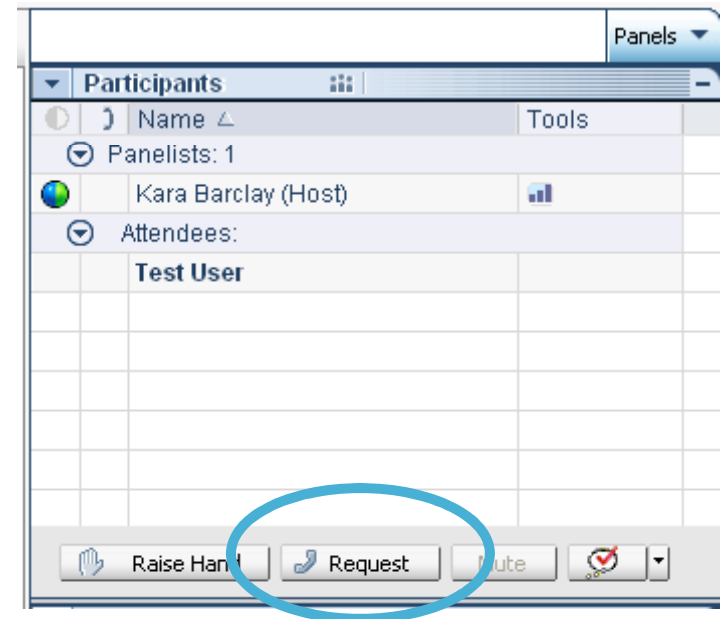
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Legal Background to Clean Power Plan

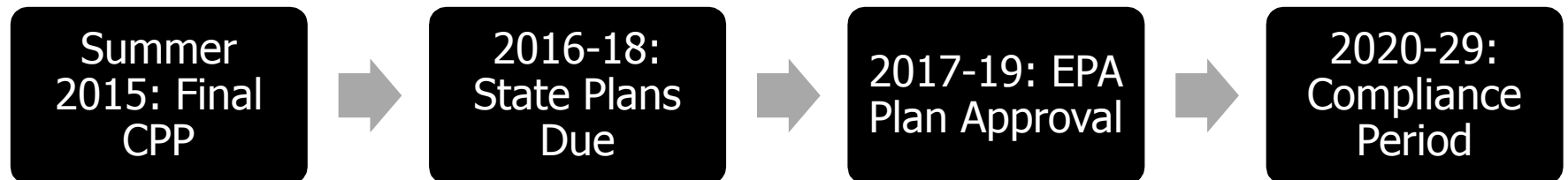
- 2007: *Massachusetts v. EPA*: Supreme Court holds that GHGs qualify as “air pollutant” under the Clean Air Act
- GHG action on existing power plants:
 - 2013: President Obama issues presidential memorandum directing EPA to use section 111(d) of the Clean Air Act to propose regulations to reduce carbon pollution from existing power plants
 - June 2014: EPA issues draft Clean Power Plan
 - Novel approach: Rather than focusing only on emissions limits from plants, addresses mechanisms “outside the fence line” of power plants such as energy efficiency, renewables, and cap & trade
 - Legal challenges on the “outside the fence” proposals (Building Blocks 3 and 4)
 - If Building Blocks 3 and 4 are ruled invalid, EPA might come back with greater reductions through Building Blocks 1 and 2

Political Landscape

- The Obama Administration sees this as part of its legacy
- President wants the final rule in place before he leaves office
- Some on Congress are opposed
- Lisa Murkowski, Chairman of the Senate Energy Committee, has used FERC to counter the EPA agenda on climate change
- States upset with reduction targets
- RTOs and NERC have raised reliability concerns
- FERC caught in the middle; wants to protect reliability but wary of trying to regulate through another agency's rule
- Senator Mitch McConnell has urged states to refuse to draft SIPs
- Legislation to delay implementation has been introduced

Clean Power Plan Overview

- Focuses on electricity production, which is the largest source of GHG emissions in the US (32% of all US GHG emissions)
- Goal: 30% reduction in carbon dioxide emissions from 2005 levels by 2030
 - Interim goals would require most reductions by 2020 (causing most concern)
 - State-Based Goals: EPA-established state baseline measured in CO2 per MWh, resulting in reductions stemming from 11% (ND) to 72% (WA)
 - States can choose to measure using a mass-based emission standard such as tons of CO2 per state per year



Anticipated Timeline for Legal Challenges

- **August 2015:** EPA promulgates Final CPP Rule
- **September – October 2015:** Petitions for Review filed
- **May – June 2016:** Parties submit briefs
- **September – November 2016:** Oral arguments
- **March – May 2017:** Court issues decision
 - These are estimated dates; ultimate timeline will depend on timing of EPA action and the appeals court's timeline for briefing and issuing its decision
 - EPA has had success recently before the courts:
 - DC Circuit upheld the MATS rule
 - Supreme Court upheld the Cross-State Air Pollution rule
 - Some legal experts believe Building Blocks 3 and 4 are the most vulnerable

Options for Compliance

- Voluntary state compliance: State Implementation Plans
 - 1) Reduction in reliance on coal power
 - 2) Increased natural gas
 - 3) Increased renewables and nuclear
 - 4) Enhanced energy efficiency
 - Future changes by states regarding resource planning would require EPA approval
- No voluntary state compliance: Federal Implementation Plan
 - Limited flexibility because of limitations on co-opting state regulatory authorities
 - Likely focused almost exclusively on coal reduction
- Inter-state cooperation encouraged, but not required

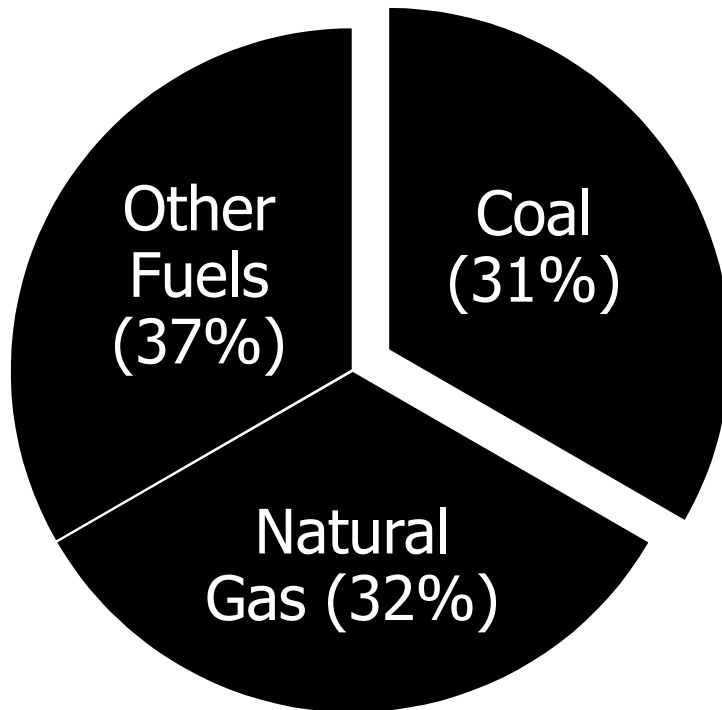
EPA's List of Tools for Meeting Goals

- Demand-side energy efficiency
- Electricity from low/zero emission facilities
- Greater use of existing combined-cycle units
- Improvements to transmission efficiency
- Energy storage
- Retirement of high-emission units
- Energy conservation
- Retrofitting units for partial carbon capture & storage
- Biomass generation
- Efficiency improvements at high-emission plants
- Market-based trading (e.g. cap & trade)
- More renewable generation
- Changes in dispatch
- Conversion of generation to natural gas
- New natural gas combined cycle units

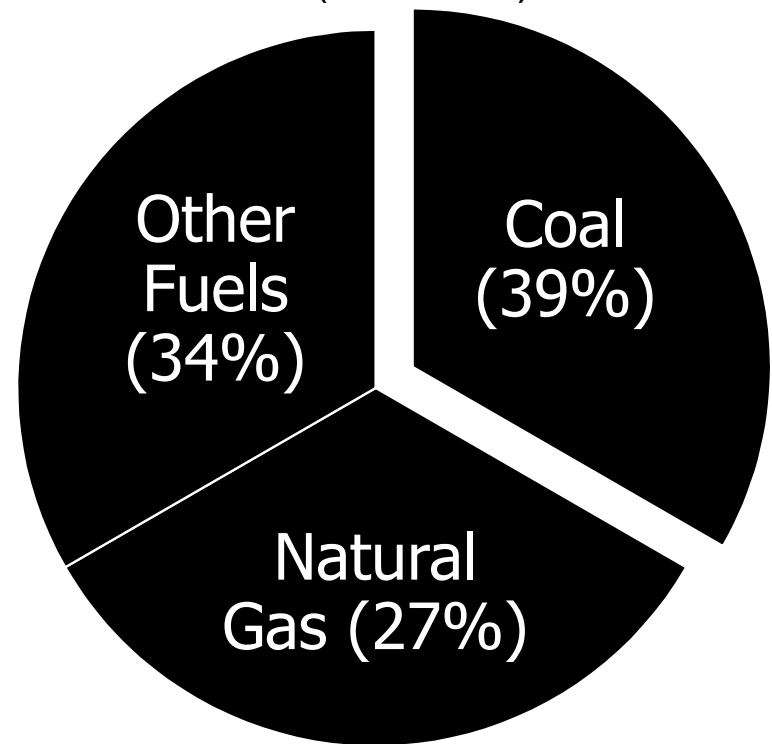
EPA's Expected Fuel Mix in 2030

- EPA expects coal and natural gas to each be more than 30% of the US generation mix in 2030

2030 Estimated



2014 (EIA Data)



Commercial Issues from Clean Power Plan

- Electricity costs increasing:
 - As much as \$366B from 2017 through 2031
 - Utility estimates:
 - For coal-dependent states, increases up to 20%
 - For less coal-dependent states, increased up to 10%
 - EPA estimates 6 to 6.5% increase
- EPA compliance does not mesh well with capacity market rules
 - Entities must bid in well ahead of time (e.g. 3 years), but the final rule is uncertain, as is each state's individual plan, so the ultimate effect on generation remains unclear
 - Generation may be bid in for multiple years, but forced to retire by CPP
 - Violate capacity market commitments?
 - How do you determine existing capacity if it is unclear whether certain plants will be available in three years?

Reliability Implications of Clean Power Plan

- Reductions in coal-power generation likely to create reliability issues
- NERC's View (April 2015 Report):
 - Uncertainty regarding whether new generation can be built in the time needed to address the retirement of coal resources
 - Change in generation mix drive concerns regarding frequency response, voltage support, and ramping capability
 - Extensive transmission expansion needed
 - Power flow changes will require significant planning and coordination to address
- Opposing Views:
 - Retirement of worst plants leverages CO2 reduction, not all coal the same
 - Options exist for avoiding risks of overreliance on natural gas reliability
 - States have flexibility to fashion their own plans

Reliability Implications of Increased Natural Gas Reliance

- NERC estimates gas usage may increase from 39 Bcf/d to 50 Bcf/d (approximately 30% increase)
- Natural gas is a lower emission fuel, but increasing reliance leads to additional reliability issues
 - Gas-fired generation more susceptible to cold weather disruptions
 - Freezing plants; Competition from LDCs
 - Gas-electric coordination still in need of improvement
 - Gas pipelines face security issues more extreme than the more resilient “grid” of electric transmission
 - Gas is not as easily stockpiled as coal against disruptions in delivery
- Gas may not be available
 - Sufficient gas capacity may not exist in some regions to support new plants
 - Gas pipelines typically built to accommodate existing commitments, not significant headroom for future growth
 - May not be able to site, permit, and construct enough pipeline and distribution capacity

Implementation Issues

- Possible regional approaches rather than state-by-state
 - Flexibility, shared burden
 - States with easier compliance (e.g. high wind) assisting those that are more coal-dependent
 - More reliance on transmission construction
 - Increased reliance on interstate markets
- Reliability mechanism to address reliability issues during implementation by providing compliance flexibility
 - Could include FERC input during EPA review of state plans
 - FERC is coordinating with EPA through interagency review
 - Possible removal of 2020 interim goal to provide longer ramp time

FERC Reliability Review Role

- Reliability Assurance Mechanism

- Core elements could include:
 - State or regional CPP plans
 - Reliability assessment of CPP plans by NERC
 - Evaluation of CPP plans against established reliability criteria
 - Consideration of reliability assurance mechanism options such as:
 - Infrastructure implementation options
 - Adjustments to implementation targets
 - Reliability Must Run generation
 - Entity or state-specific CPP implementation plan modifications
 - Reliability-specific adaptations and provisions to maintain reliability
- NERC's role:
 - Serve as a resource for states/regions in developing plans before sent to EPA
 - Reliability assessments and review of plans during plan review period
 - Identify risks to reliability during implementation period, including insufficient time to add infrastructure, unanticipated conditions, conflicts between reliability and CPP implementation, load shedding to satisfy CPP

FERC Reliability Review Role

- Reliability Safety Valve
 - Unit-Specific enforcement discretion if permit limits violated because of reliability response
 - FERC documents reliability concerns
 - Does not prevent citizen suits under the Clean Air Act
 - Not clear how such an approach would work under the CPP

MATS

- Mercury and Air Toxics Standards
 - Coal fired power plants must install Maximum Achievable Control Technology (MACT), protecting against mercury, other toxic metals, acid gases, and some toxic organic compounds
 - Costly, particularly for plants burning Appalachian and Illinois Basin coal
 - Capital cost similar to a new gas-fired power plant
 - Less expensive for plants burning Powder River Basin coal
 - Due April 16, 2016, but extensions available
- Estimated retirement up to 35 GW (100M MWh/year)
- Retirement of coal units result in:
 - Significant increase in gas generation output
 - New gas generation construction
 - Increased gas usage

Estimated Generator Retirements

- Likely retirements are:
 - Older units (online in 1960s-1980s)
 - Smaller units (300MW or less)
 - Higher pollution plants
 - Less used plants
- Retirements Driven by CPP = 60 GW of coal-fired generation
- Retirements Driven by MATS = 35 GW of coal-fired generation
= Total of 95 GW (EPA estimates as much as 120 GW retired)
- NERC expects most significant retirements to occur in ERCOT, SPP, NPCC, and MISO
- Caveat: Poor capacity factors for remaining coal units could drive further retirements

Compounding Drought-Related Reductions

- 2005 level used to set CPP baseline for each state was before worst effects of Western drought
- West relies on a significant amount of zero-emission, low-cost hydropower to meet generation needs
- If drought continues, reservoir water levels fall, reducing water speed and therefore generation capacity
 - Some retrofitting to assist
- Lost hydro capacity will need to be replaced by other generation
 - Increases need for new capacity
 - Replacements may not be zero-emission



Near-Term Opportunities

- Markets
 - Expanded sub-RTO markets across states
 - E.g., Energy imbalance markets
 - More capacity products (energy efficiency, advanced demand response, regional bulk storage)
 - Capacity more valuable (but could create regulatory risk if cost is too high)
 - Greater need for ancillary service providers due to increased reliance on renewable generation and distant generation
 - Frequency response and spinning and supplemental reserves
 - Strategically-placed dynamic reactive power resources (shunt capacitors, synchronous condensers, static Var compensators, etc.) to maintain voltage stability
- Expansion of gas-electric coordination efforts
- Leveraging existing transmission planning
 - Increased development in existing transmission planning processes
 - Post-Order 1000 competition in transmission planning
- Investments in initiatives incorporated in state plans:
 - Demand response, distributed renewable generation, energy efficiency, etc.

Long-Term Opportunities

- Facility Investment Opportunities
 - New and expanded natural gas generation
 - Unlikely to have new nuclear (2030 deadline is too soon for nuclear construction)
 - Major renewable generation investments
 - Gas pipeline expansion (up to 10,000 miles predicted)
 - Increased gas storage (both gas and LNG)
 - Electric transmission construction (greatest need in RFC, NPCC, and Southwest WECC)
 - Benefits
 - Need to meet compliance objectives may speed siting approvals
 - Risks
 - Environmental opposition to gas pipeline expansion
 - Electric transmission siting is increasing difficult due to political and legal complications
 - Potential return to federal statutory solution
 - Reductions in ROE for transmission investment
- Expanded energy markets
 - Expansion of existing RTOs
 - Creation of new RTOs
 - BUT . . . state-specific requirements could increase segmentation of regional grids

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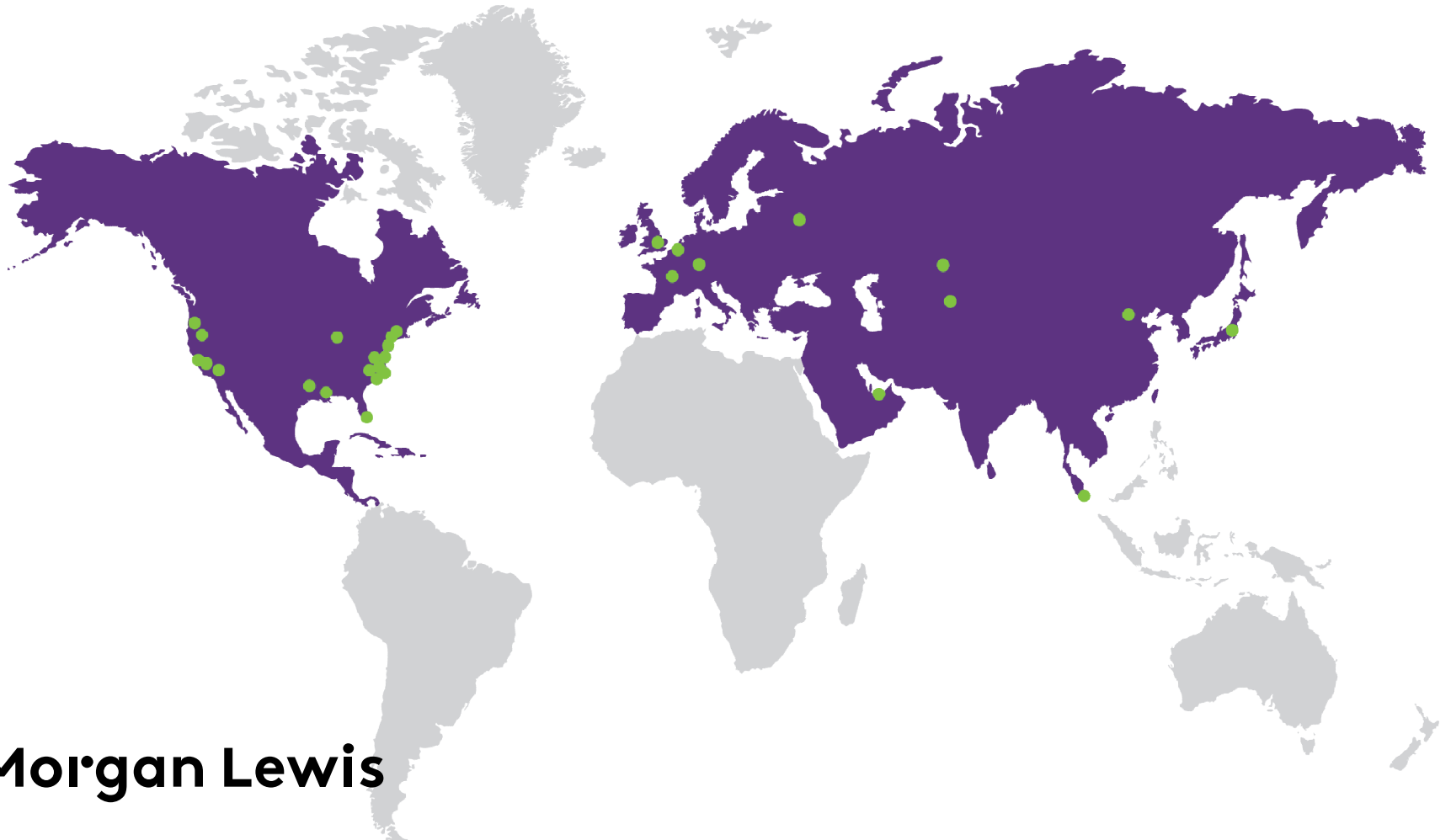
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