May 3, 2018

Implementation

Kigali Ratification

Economic Impact of
American-made products that preserve the health, safety and comfort of our daily lives.

Remainder of the manufacturing sector aerosols, and several other applications make up the
insulating foams, medical metered-dose inhalers,
and motor vehicle air conditioning
HVAC, commercial refrigeration, household appliances,
fluorocarbons are used in commercial HVAC, residential

US Industry Segments (Fluorocarbons)
We urge the Administration to submit the Kigali Amendment to the US Senate.

Leadership of trade and continued American technology amendment is good for American jobs, the balance of trade, and in the rapidly expanding global market.

Analysts indicate that implementation of the Kigali Amendment provides a Global platform for gradual introduction and commercialization of next generation technologies in the US and in the Global market. The Kigali Amendment provides a Global platform for Refrigeration (HVACR) and Fluorocarbon implementation.

Implementation of the Montreal Protocol and domestic amendment to the Kigali Amendment supports ratification of Kigali.

US Industry Objective
Fluorocarbons in the American Economy

US Manufacturing Impact

- $178B contribution
- 67k jobs, dominated by HVAC
- $205B in sales
- $399B in payroll
- 589k direct HVAC employment
- 2.5M total employment impact
- $621B in economic output
- $51.9T in induced demand
- Manufacturing (includes supply chain and manufacturing, distribution, service and installation)
Downstream employment is over 3x the size of the manufacturing employment.

Manufaturing Employment 2016 (Thousands)

Direct Industry Employment - 2016 (Thousands)

Current manufacturing impact is 138,4K jobs

US Industry Segments
American Industry must lead the transition to new technologies to be competitive

- Typical design cycle for the industry is 5-10 years, decisions being made now
  they lead this transition
- The US HVAC industry has traditionally led these transitions and it is vital
  the Montreal Protocol transition
- Commercialization of next generation technology is essential at this point in
  American Innovation
- Opportunities
  - Foams, medical applications, and aerosols also have large global growth
    and this transition is at its apex between now and 2047
- Developing countries will transition away from ozone-depleting substances
  developing countries are already transitioning to new technologies
  - The cumulative global market will be over $1 trillion+
  - International HVACR market expected to more than double
  - Over the next 10 years...
Kigali Amendment Ratification is essential to jobs growth, industry growth, trade balance.

- Manufacturing impacted directly
- Positive impact on balance of trade

Trade Balance
- No ratification scenario
- Total increased output of $38.8B versus
- Manufacturing output by $122.5B
- Kigali ratification improves direct

Direct Economic Output
- Incremental 150K jobs economy-wide
- Manufacturing Growth translates into an
- Manufacturing jobs by 33K
- Kigali ratification increases direct
- Current manufacturing impact is 138.4K

Manufacturing Jobs

Kigali Ratification Impact

2027

Kigali Ratification Jobs W/
Kigali Amendment ratification will grow US exports and improve balance of trade.

- Benefit billion in net trade
- Manufacture adds $1T
- Flurocarbon imports by $6.5B
- Technology HVACR growth of old
- Kigali will inhibit
- Markets by $5.0B
- Global HVACR
- Increase US supply to
- Kigali ratification will

Global Trade Impacts
US is a net importer, but gains share of global market with Kigali Amendment Ratification

Without Kigali

2016

6%

%2017

7%

7.2%

%9.0%

%10%

Export Market
U.S. Share of World HVAC

The HVACR Global Export Market

Kigali Ratification Impact

Underperform

Without Kigali, exports will
underperform, increasing US share of
global market from 7.2% to 9.0%

With Kigali, US exports will
perform and Africa
America, and Africa
needs of China, India, Latin
will grow by 6% per year to meet

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Reclaimed HFCs with Kigali Ratification are estimated to increase reclaim sales by $0.8 billion and add almost 4,000 jobs (not included in totals).

- $1.2 billion net benefit included in analysis.
- Kigali Ratification would benefit from increased exports if Kigali Ratification
- Fluorocarbon manufacturing would benefit from increased exports if Kigali Ratification.
Kigali Amendment ratification essential to maintain and expand American leadership

- Move to international markets to meet local demand for new technologies
- Without Kigali ratification, manufacturing and R&D for new technologies will generate 7,400 additional jobs and $1.7 billion in capital investment if Kigali is ratified
- American investments in R&D and capacity for Kigali-related growth will
  - High efficiency equipment using next generation refrigerants committed $5 billion through 2025 in R&D and capital investment to commercialize
  - In 2015, AHRI members representing 90% of US HVACR manufacturing are already underway investments in next generation refrigerants and equipment technologies

• Domestic demand
• The American HVACR industry led Global Innovation, which is driven by

HVACR Technology & Investment
Reported results are consensus projections.

- Key projections derived from interviews and surveys of industry experts.

- Growth based on economic models and industry input.

- Indirect and induced impacts estimated with Iformation models.

- Direct industry size based on Census data and industry interviews.

- HVACR.

- All segments of hydrocarbon using and producing industry assessed; focus on scenario analysis.

- Information and JMS Consulting contracted to assess industry size and conduct.