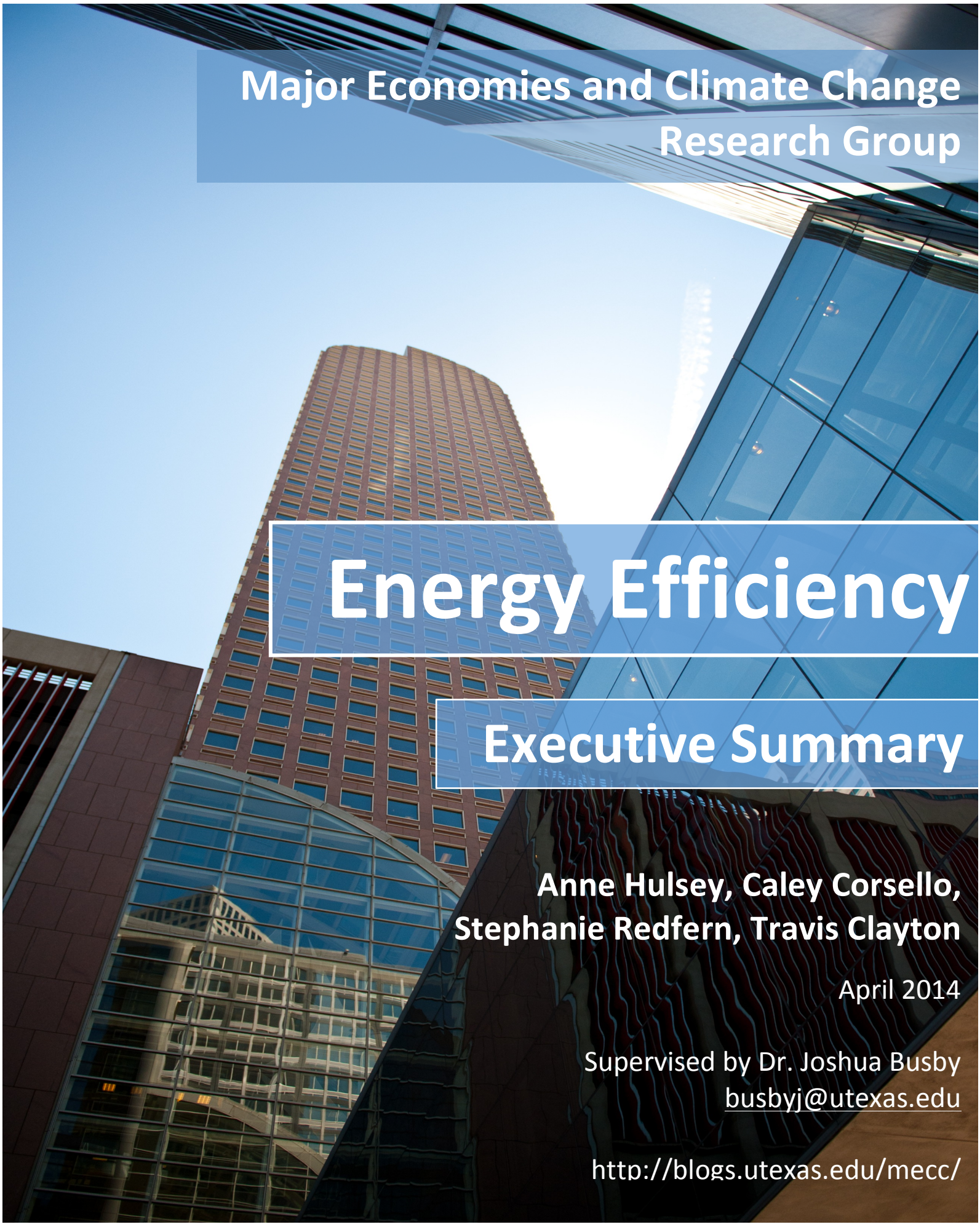

Major Economies and Climate Change Research Group

Energy Efficiency

Executive Summary

Anne Hulsey, Caley Corsello, Stephanie Redfern, Travis Clayton

April 2014

Supervised by Dr. Joshua Busby
busbyj@utexas.edu

http://blogs.utexas.edu/mecc/

EXECUTIVE SUMMARY

Energy efficiency is a promising venue for greenhouse gas emissions reductions, especially given its appeal based on economic benefits. Potential for efficiency reductions is best quantified through current emissions and future projections data for sectors such as building and industry, which have significant opportunity for efficiency measures. Another avenue for increasing efficiency is smart grid infrastructure, through which monitoring can both allow for more efficient generation/dispersion of electricity and inspire conservation among consumers.

(1) Building Sector

The building sector accounts for a fifth (19%) of current global emissions, with the U.S., E.U., and China contributing over half (57%) of the sector emissions. Though the McKinsey Business as Usual (BAU) scenario predicts a 26% (2.4 $GtCO_2e$) global increase by 2030, additional abatement measures could reduce that growth by 3.0 $GtCO_2e$. The abatement potential in these three countries/regions alone would eliminate 14.5% of the world's BAU building emissions. Effective abatement tools include appliance standards, energy certification, and building codes.

Barriers

- Fragmentation of stakeholders: split incentives among various parties
- Payback delay: long payback periods for upfront costs deter investments
- Lack of information: inability to quantify current energy use
- Lack of awareness: misunderstanding or ignorance of energy efficiency options
- Secondary political priority: economic growth take precedence
- Insufficient building codes: status quo is maintained over efficiency innovations
- Enforcement challenges: inability to effectively enforce building codes

Recommendations

- Adopt and enforce stringent building codes based on certification systems
- Commission city-wide review of existing building codes
- Require use of appliance energy labels
- Focus on public-private partnerships to finance energy efficiency investments

(2) Industry Sector

A third (32%) of current global emissions comes from the industry sector. Chemicals, iron and steel, and cement are the largest subcategories, accounting for 57% of total industry emissions. The 2030 McKinsey BAU scenario predicts a 56% (8.6 $GtCO_2e$) increase, with the majority of emissions coming from China (3.5 $GtCO_e2$) and India (1.7 $GtCO_2e$). Global abatement potential is 6.9 $GtCO_2e$, with 3.7 $GtCO_2e$ in China alone. Potential abatement techniques are common among all three large industries: implementing the latest technology, switching feedstock, combining power and heating processes, recycling, and carbon capture and sequestration.

Barriers

- Payback delay: though overall costs may be negative, initial investment is high
- Complex markets: global markets for some industries, highly localized for others
- Link to developing economies: aversion to risking growth of critical industries
- Resistance by population: to alternative fuels such as solid waste
- Ambiguity in regulatory authority: overlapping/conflicting regulations
- Demand from other sectors: demand for CO_2 heavy ammonia in biofuel production

Recommendations

- Develop technological standards and incentives for standardizing equipment
- Adopt energy efficiency labels such as Energy Star
- Facilitate energy efficient technology transfers to developing countries
- Support international ventures to reduce evasion of regulation through outsourcing

(3) Smart Grid

Finally, the smart grid offers a way to transform power distribution and set in motion efficiency opportunities across many sectors. By facilitating dynamic consumer price schemes, the smart grid prompts a flatter demand curve that reduces the need for fossil fuel-fired peaking power plants. Smart grid infrastructure will also facilitate the spread of new efficiency programs, distributed renewable energy generation and widespread integration of electric vehicle interfaces. Even in rural areas of undeveloped countries, the smart grid offers a viable power system option due to its adaptability as local, modular grids that can not only be integrated as they grow but also deliver rapid returns on investment.

Barriers

- Upfront costs: high initial investments are a significant obstacle
- Uncertainty of customer participation: unsure how well customers will respond to dynamic pricing and the smart grid
- Opposition to smart grid: concerns over privacy, security, health risks, costs/benefits
- Need for regulatory policies: new types of data collection require new policies
- Appliance interoperability: need set of international standards for smart systems

Recommendations

- Establish international protocols and standards for equipment, data collection etc.
- Develop policy for regulating privacy
- Invest in marketing, R&D and pilot programs to build trust in scheme
- Implement educational programs
- Encourage renewable energy growth and enable dynamic electricity pricing

In sum, these three levers – building efficiency, industry efficiency, and the smart grid – have the potential to greatly reduce CO_2e emissions, while simultaneously enhancing cost effectiveness.