

Role of Car-free Zones and Internal Combustion Engine Bans To Reduce Oil Use and Emissions in Urban Transport

Abstract: Transport represents one of the highest contributing sources of oil use, pollutant and greenhouse gas emissions and therefore many countries and cities are investigating how to direct abatement activities into that sector. Some cities, like Paris, Madrid, Hamburg and Chengdu, are undertaking restrictive policies such as bans on internal combustion engine (ICE cars) and pedestrian zones and other policies that reduce driving. Several countries are considering national bans on new sales of ICE engine cars by 2040. We consider the literature on proposed policies to shift urban transport modes away from use of cars in urban regions. We then, with our own modeling, estimate the potential impacts of a combination of policies being put into practice to contribute to a peaking in oil demand. We find that combined, national level car bans, urban zone bans, and modal shift policies could contribute significantly to leveling off oil demand trends compared to a business as usual. Subtracting for any overlap in impact, if applied widely around the world, these combined policies could cut oil use by over 9 mmB/D by 2050. The resultant lessening of oil use would save 0.66 gigatons in CO₂ emissions by 2050, compared to a “baseline” type scenario.

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Methods

We utilize a widely respected third-party transportation and energy model to contribute to the literature by highlighting the volumetric potential that combining these two particular policies might have on oil use as a means to greenhouse gas mitigation. We blend insights from the existing literature into our analysis since restrictions for automobiles are most effective when they increase the use of transit, cycling or walking. We find that combining ICE engine bans and car-free city centers could be an effective policy to stimulate a peaking in oil use in the 2030s and thereby reduce greenhouse gas emissions from personal automobile use in the urban setting. However, for these policies to offer optimum impacts and to avoid unintended consequences, they need to be implemented in tandem with other urban sustainability approaches that increase accessibility by other means, such as cycling programs, public transit and land use policy.

For the analysis of the two policies (urban modal shifts and national ICE vehicle sales bans) undertaken in this study, we developed scenarios and projections that are calibrated to those of a global model of urban passenger travel: the International Energy Agency’s (IEA) Mobility Model (MoMo). This is a “what if” style spreadsheet model with detailed data and projections for urban travel, vehicle stocks and energy use around the world, broken into 32 countries and regions. This methodology results in forecasts that are based on very detailed data while concurrently allowing for a deeper understanding of underlying drivers. For the purposes of this analysis, we simplified the modeling by creating a standalone scenario tool, with detail level data related to vehicle adoption and use and other transport modes that are specifically needed for this analysis. Comparisons to base year data and “business-as-usual” projections are calibrated to the more comprehensive modeling outputs of MoMo. This approach allows us to illustrate isolated factors consistent with the IEA’s general framework while still offering scenario insights contextualized in comparison to the more robust IEA published analysis.

Results

We survey the literature on urban sustainability policy and find that two policy levers, ICE engine bans and car free city centers, are gaining momentum. The literature suggests that these policy tools need to be considered together with a suite of approaches, including land use management, improved access to city cycling resources and public transit and tighter regulation of ride sharing.

We estimate that a combination of car free city centers, bans on internal combustion engine technologies in key markets and other urban sustainability policies could cut oil use by about 9.3 mmboe/d (rather than 11.5 million if the two were fully additive). Similarly, CO₂ emissions reductions would be about .668 gigatonnes rather than the .826 it would be if they were fully additive.

Combined Policy – Global Oil Demand Impact

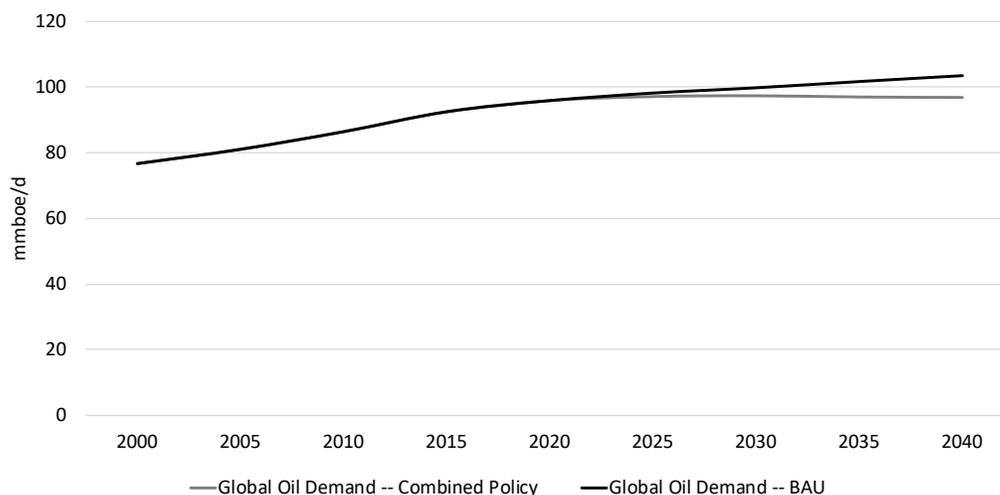


Figure 6. Impact on Total Global Oil Use from combined ICE Ban and High Shift Urban Sustainability Policies

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