

Analysis of the Seattle Bag Tax and Foam Ban Proposal

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I. Introduction

Seattle's Mayor Gregory J. Nickels and City Council President Richard Conlin recently proposed a program to reduce the use of disposable plastic and paper shopping bags through a "green fee" on their use. The program also calls for a ban on the use of expanded polystyrene (EPS) foam containers in the food industry. If adopted by the Seattle City Council, the program will go into effect on January 1, 2009.

Programs similar to the proposed Seattle program are in effect elsewhere, both in other U.S. cities and in other parts of the world. A number of justifications have been offered for such programs. One justification offered in the past was that the production process for polystyrene foam containers involves the use of chlorofluorocarbons (CFC's), which deplete the earth's stratospheric ozone layer. Since the discontinuation of the use of CFC's in the 1990s, however, the public's attention has shifted to global warming, climate change, fossil fuel consumption, and greenhouse gas emissions. A reduction in the production of disposable shopping bags and polystyrene foam cups and clamshell containers, it has been argued, will reduce greenhouse gas emissions and fossil fuel consumption. Another line of reasoning that has been offered is that landfill space is scarce, we are running out of it, and reductions in the use of disposable shopping bags and polystyrene foam containers will help to alleviate this problem. Another rationalization for these programs is that plastic and paper bags and polystyrene foam cups are an important and highly visible component of roadside litter and that such visual pollution will be reduced by green fees and foam container bans.

In Seattle, Mayor Nickels justified his proposed program by suggesting that "These actions will take tons of plastic and foam out of our waste stream . . . The best way to handle a ton of waste is not to

create it in the first place . . . Taking a reusable bag to grocery stores and pharmacies is a simple thing that has an enormous impact.”¹ An extensive report on the possible impacts of the Seattle program was written by Herrera Environmental for Seattle Public Utilities. An online characterization of the results of that study suggested that

“all disposable paper and plastic bags have significantly negative energy, climate change, wastewater, litter and water quality impacts on Seattle’s environment. The green fee and ban on EPS food containers will greatly reduce the use—and hence production—of these plastics which remain as persistent environmental pollutants. The green fee on disposable shopping bags, for example, will cut greenhouse gas production now caused by the unrestrained use of the products by 40 percent—about 112,000 tons over 30 years, roughly 4,000 tons per year or the equivalent of taking 665 cars off the road.”²

The purpose of this report is to discuss the possible effects of the Nickels/Conlin program. An important component of our approach to addressing these issues is to examine the impacts that similar programs have had in other locations. Our primary comparator for the tax on plastic bags is the experience of Ireland, where a similar tax was implemented in 2002. For the possible impacts of a ban on polystyrene foam containers, we look primarily at the experience of Portland, Seattle’s neighbor to the South, where a comparable ban was implemented in 1990. Our examination of the Irish and Portland experiences reveals that there are both benefits and costs associated with bag taxes and foam container bans. Whereas the potential benefits of such programs may receive the most attention, it is prudent to also consider the costs of the programs. While we do not attempt to quantify either the benefits or the costs of the Seattle proposal, we do make some qualitative assessments.

¹ Seattle Public Utilities, News Releases, “Nickels and Conlin Propose Green Fee on Shopping Bags, Ban on Foam. Proposed Waste Prevention Measures Would Take Effect Jan 1, 2009,” April 2, 2008, accessed on June 18, 2006 at http://www.seattle.gov/UTIL/About_SPU/News/News_Releases/SPU01_003528.asp.

² See “City of Seattle Disposable Shopping Bags Green Fee and Expanded Polystyrene (EPS) Foam Food Container Ban,” at http://www.seattle.gov/util/stellent/groups/public/@spu/@csb/documents/webcontent/spu01_003527.pdf (accessed June 6, 2008).

Our conclusion, briefly, is that the proposed Seattle program will be largely symbolic and will have little or no noticeable impact on environmental quality in the Seattle area. The polystyrene container ban may actually result in the use of materials that are more harmful to the environment than the cups, plates, and containers being banned. The Seattle program, if enacted, will be a “feel good” program whose substantive benefits will likely be insignificant and whose costs may be considerable.

Our recommendation is that the Seattle City Council take a step back and reconsider the problems being addressed with the proposed program. Alternative solutions with comparable benefits and lower costs may be available. For example, most grocery retailers now have recycling bins for plastic grocery bags, and methods might be considered for encouraging the expansion of such private/public-sector programs. This is essentially the tact that New York City is currently pursuing. In addition, polystyrene foam recycling efforts in Portland and elsewhere might be examined and efforts might be made to encourage the development of such programs in the Seattle area. Moreover, the public good may be better served with programs that have the potential to have noticeable impacts. An obvious and growing problem in the Seattle area is traffic congestion. A program that reduced this congestion, even by 1 or 2 percent, would have impacts on greenhouse gas emissions several orders of magnitude larger than the proposed Seattle program that is the focus of this report.

II. Seattle’s Proposed Program

Early in April of this year Seattle Mayor Gregory J. Nickels and City Council President Richard Conlin proposed the implementation of a “green fee” on disposable shopping bags and a

ban on the use of expanded polystyrene (EPS) foam containers in the food industry.³ If the proposal is adopted by the Seattle City Council, the program will go into effect on January 1, 2009.

Under the proposed program, a fee of \$0.20 per bag will be charged on all disposable shopping bags (paper and plastic) dispensed at the (roughly) 575 grocery, drug, and convenience stores in Seattle. These stores are estimated to be responsible for about 73 percent of all disposable bags distributed in Seattle.

The proposed green fee will not apply to bags used in stores to hold bulk items such as deli goods, bakery goods, fruits, vegetables, nuts, candies, and grains. Bags used to hold newspapers and dry-cleaner bags will also be exempt.

Of the proposed \$0.20 fee per bag, \$0.05 would go to the merchant for administrative costs and taxes. If the business grosses less than \$1 million, however, it will keep the entire \$0.20 fee. For businesses that gross more than \$1 million, \$0.05 per bag will go to the vendor and the city will receive the remaining \$0.15. The revenue the city collects will be used for waste prevention, recycling, city cleanup and environmental education programs. Preliminary plans call for the tax to be charged at checkout and listed on the receipt. The city is expected to collect its portion of the fees quarterly.

A primary goal of the green fee is to promote the use of reusable shopping bags. To accomplish this, the city will set aside \$1 million of its receipts from the program to distribute these bags and to provide information on their advantages.

There are a number of existing programs throughout the United States and worldwide that either tax or ban disposable plastic shopping bags. One response of consumers to these

³ See “Nickels and Conlin Propose Green Fee on Shopping Bags, Ban on Foam” City of Seattle News Advisory, April 2, 2008, at <http://seattle.gov/news/detail.asp?ID=8328&Dept=40>.

programs is to substitute paper for plastic bags. Life cycle studies, which estimate the amount of energy used in the production, use, and disposal of various products, indicate that disposable paper shopping bags use substantially more energy, materials, and landfill space than comparable plastic bags.⁴ To prevent such substitution, the Seattle program will tax paper bags as well as plastic bags. The proposed Seattle program appears to be virtually unique in this regard.⁵ In section III below, we discuss the possible impacts, both positive and negative, of the green tax.

The Seattle program also imposes a ban on EPS disposable foam containers used by the food service industry. The ban covers such everyday items as plates, trays, “clamshells”, and cold and hot beverage cups used at restaurants, delicatessens, fast food outlets, and coffee shops, as well as egg cartons and meat trays used at grocery stores. In addition, by July 1, 2010, all food service businesses will be required to convert from disposable plastic and plastic-coated paper products to materials that are locally recyclable or compostable. Nickels and Conlin suggest that, because cities throughout the world are implementing policies to discourage the use of throwaway plastic and plastic-coated paper products, the industry is responding with the development of new products. These include compostable plastics made from such vegetable sources as corn starch and sugar cane. Speculation is that there will likely be a variety of new products on the market in the near future.

The proposal also calls for business advisory committees to be set up by the city to represent the retail and restaurant sectors during the transition period. Further, the city will offer to assist food service businesses in working together to obtain lower prices for new compostable products.

⁴ Source: Lilienfeld, Robert (2007). “Review of Life Cycle Data Relating to Disposable, Compostable, Biodegradable, and Reusable Grocery Bags, *The ULS Report*, June 1, 2007. Accessed June 3, 2008 at http://www.deq.state.mi.us/documents/deq-ess-p2-recycling-PaperPlasticSummary_2.pdf.

⁵ Santa Monica has a similar program in the drafting stage.

Predicted Impacts of the Proposed Seattle Program

Seattle Public Utilities estimates that each year approximately 360 million disposable bags are used in the city, and that most of these are made of plastic. About 73 percent of these are estimated to come from the 575 stores (out of an estimated 3,600 retail and restaurant businesses in Seattle) that will fall under the purview of the proposed program. Moreover, whereas Seattleites recycle a high proportion of the paper bags they collect, most of the plastic bags reportedly end up in landfills.⁶

It is predicted that the green fee will reduce the number of disposable shopping bags issued by the 575 stores in the program by 70 percent or more, and that the overall use of disposable bags will fall by more than 50 percent. Its advocates, who claim the program will prevent the manufacture of 184 million (= 360 million * 0.73 * 0.70) disposable shopping bags annually, further estimate that the program will cut greenhouse gas production by nearly 112,000 tons in the next 30 years. This is equivalent to “roughly 4,000 tons per year, or the equivalent of taking 665 cars off the road.”⁷

It is estimated that the city will collect about \$10 million annually from the green fee. Annual collection and enforcement costs are predicted to be about \$750,000, and during the first year of the program, Seattle Public Utilities (SPU) plans to spend about \$1.5 million to promote the switch to reusable shopping bags. This, it is suggested, will be particularly helpful to low-income families and the elderly. The balance of the annual fees will be used to support and possibly expand existing waste prevention and recycling programs. The EPS ban and the green

⁶ 82 percent of paper bags in Seattle get recycled. 13 percent of plastic bags in Seattle get recycled. The national average for plastic bag recycling rates is 3 - 5 percent. Source: Herrera study, Volume I, p. 3-3.

⁷ Source: City of Seattle Disposable Shopping Bags and Green Fee and Expanded Polystyrene (EPS) Foam Food Container Ban, Frequently Asked Questions (FAQ), accessed June 3, 2008 at http://www.seattle.gov/util/stellent/groups/public/@spu/@csb/documents/webcontent/spu01_003527.pdf.

fee will be enforced by inspectors to be hired by SPU for the purpose of ensuring that stores comply with the regulations.

III. Experience with similar programs elsewhere

Plastic Bag Taxes

Programs directed at reducing the use of disposable plastic grocery bags have been implemented in a number of other states and countries.⁸ Some programs call for a complete ban on the use of plastic grocery bags. For example, bans have been implemented in (all or parts of) Taiwan, Bangladesh, Pakistan, South Africa, and India.⁹ Although justifications for such bans vary, one notable reason has been to prevent water and sewage systems from getting clogged with plastic bags and causing floods.¹⁰ Another is that cattle in India have reportedly died from ingesting plastic bags. Other programs tax the use of disposable plastic grocery bags. The tax program that has probably received the most attention in the media is the Irish “PlasTax.” This was the first such system implemented and has been in effect since March 2002.

The Irish tax was implemented to change consumer behavior (not to generate revenue) and to change people’s habits with respect to reducing/reusing plastic bags.¹¹ The program has been described as a simple market-based solution in the form of a \$0.15 per bag consumption

⁸ See table ES-1, and Appendix B in Volume II to of the Herrera Report for a listing of jurisdictions with such programs.. Also, see “Plastic not fantastic? Bag bans around the world,” Reuters, May 27, 2008, at <http://www.reuters.com/article/latestCrisis/idUSPEK170445> (accessed June 10, 2008) for a listing of countries with plastic bag bans and taxes.

⁹ It is noteworthy that in March 2006 Taiwan partially rescinded a plastic bag ban that had been in effect for over four years. See “Taiwan rescinds plastic bag ban,” at <http://www.carrierbagtax.com/taiwan.html> (accessed June 10, 2008) and “Outcry after Taiwan partially lifts ban on free plastic bags,” Agence France Presse – English, January 24, 2006. The portion of the ban that was lifted allowed private restaurants to distribute plastic bags to customers with no charge. These restaurants, which reportedly consume at least half of Taiwan’s plastic bags, had been ignoring the ban because the Taiwanese Environmental Protection Administration did not have enough staff to enforce it.

¹⁰ To this point, not enough time has elapsed to determine the effectiveness of these bans in reducing flooding, or on other possible effects of the bans. For one of the few studies of this topic, see Ahmed and Gotoh, “Impact of banning polythene bags on floods of Dhaka City by Applying CVM and remote sensing,” at <http://ieeexplore.ieee.org/iel5/10226/32596/01525403.pdf?arnumber=1525403>, July 2005.

¹¹ The tax has, of course, generated income. In its first year, about \$9.6 million was generated and was earmarked for a green fund established to benefit the environment.

tax, paid by consumers at checkout. As with the proposed Seattle tax, there are some exemptions in Ireland. Excluded from the tax are bags used for meat, fish, poultry, ice, unpackaged produce, foods without packaging and heavier weight reusable plastic bags. Although the Irish program does not include a tax on paper grocery bags, the environment minister told shopkeepers that if they changed from plastic to paper, he would tax paper bags too.

What have been the impacts of this program? Supporters argue that it has been highly successful and cite figures indicating that per capita annual plastic bag consumption dropped quickly by more than 90 percent (from roughly 328 to 21 bags). By 2006, however, consumption of bags increased to 31 per person annually. To reverse this trend, the tax was increased to \$0.22 per bag in July 2007. Supporters also argue that there has been a substantial reduction in the number of plastic grocery bags that become unsightly litter.

Other claims made by supporters of the Irish PlasTax include the following:¹²

- Retailers, who have to purchase and stock a smaller number of plastic bags, will save money (it was estimated that retailers were spending \$50 million annually on plastic bags before the tax). Moreover, they also benefit from the increased sale of reusable bags.¹³
- Implementation, administration, and monitoring of the program have been straightforward and relatively inexpensive.
- Littering of plastic grocery bags has been dramatically reduced. Data indicate that litter arising from plastic bags fell from 5 percent of total litter prior to the levy to 0.2 percent in 2005.¹⁴

¹² The source for much of this information is the website “The PlasTax –About Ireland’s Plastic Bag Tax,” at <http://www.reusablebags.com/facts.php?id=20> (accessed June 23, 2008).

¹³ A benefit to retailers that was probably not anticipated by supporters of the PlasTax program is that retailers have sold substantially more of the heavier weight garbage-type plastic bags.

¹⁴ See “The Plastic Bag Levy will increase to 22 cents on Sunday, 1st July 2007,” Environment, Heritage and Local Government, at <http://www.environ.ie/en/Environment/Waste/PlasticBags/>. (accessed June 23, 2008). Prior to the

- The reduced production of plastic bags has resulted in a saving of roughly 18 million liters (about 4.8 million gallons) of oil.
- People have shifted largely to reusable shopping bags, rather than to paper bags.

Although much of the information provided by the news media touts the favorable outcomes of the Irish PlasTax program, there are costs as well as benefits, and critics as well as supporters, of the program. Among the claims made by critics of the program are the following:¹⁵

- Regarding the argument that the PlasTax alleviates the litter problem, plastic grocery (carrier) bags, while highly visible, are a very small part of all litter. It is estimated that they comprise less than 1 percent of the litter on streets.
- Regarding the argument that plastic bags are a major component of materials in landfills, research suggests that plastic bags make up a trivial amount of the total—about 0.3 percent. Insofar as people have switched to paper bags, a paper bag takes up considerably more space in a landfill than a plastic bag.¹⁶
- With respect to the argument that the PlasTax has important environmental impacts, only about 2 percent of the oil consumed in Europe is used for all plastic packaging, and plastic garbage bag production uses a very small component of this percentage.

Irish tax, plastic bags on the roadside and clinging to fences were sufficiently plentiful that they were referred to as Ireland's national flower.

¹⁵ A primary source for this discussion is "The Holes in the Argument for a Carrier Bag Tax," which can be found at <http://www.carrierbagtax.com/downloads/CBC2ppLeaflet61.pdf>.

¹⁶ The argument has been made that we are running out of landfill space. For a critique of this argument, see Daniel K. Benjamin, "Eight Great Myths of Recycling" at <http://www.perc.org/pdf/ps28.pdf>.

- Plastic bags provide a good example of initiative, innovation, and resource conservation in market economies. Plastic bags today require 70 percent less plastic than twenty years ago, yet remain as strong and durable as in the past.
- Plastic bags are the lightest of all disposable garbage bags. Thus, a switch from plastic to, e.g., paper will require more energy for transportation.
- Plastic garbage bags are widely re-used by consumers, with research indicating that 80 percent of people re-use garbage bags in their household as, e.g., garbage can liners or lunch bags. Ireland's PlasTax was followed by large increases in the sale of plastic garbage bags and bin liners. Given these substitutions on the part of consumers, the magnitude (and possibly even the direction) of the impact of the Irish PlasTax on total plastic usage is an open question.¹⁷
- Plastic grocery bags provide easily visible evidence of purchase of merchandise by consumers. Since the enactment of the PlasTax, Irish retailers have reported an increase in theft, as some customers simply walk out of stores with carts full of unbagged items.
- A survey was conducted of 4,500 head offices of United Kingdom retailers for their views on a carrier bag tax and 79 percent of respondents were opposed.

A tax on plastic bags, similar to the Irish PlasTax was proposed in June of 2005 in Scotland. After researching the impacts of the Irish tax, the United Kingdom Environmental Department (DEFRA) and the government-funded Waste Resources Action Programme (WRAP) concluded that a very high proportion of households reuse their plastic carrier bags. They also found that plastic carrier bags comprise less than 1 percent of litter on the streets

¹⁷ The website <http://www.carrierbagtax.com/downloads/CBC2ppLeaflet61.pdf> cites research suggesting that there has been no significant change in the total tonnage of plastic bags shipped into Ireland following the passage of the PlasTax. The website also cites statements from an Irish manufacturer of bin bags who claims that his business has experienced phenomenal growth since the PlasTax was implemented.

and in landfills. This was reaffirmed by further research done by the HM Treasury Plastic Bag Tax Assessment, which found that use of plastic bags in the UK translates to about 0.3% of the municipal waste stream. Arguments were also made that the net impact on plastic use was unclear because heavier plastic bags would likely be substituted for the lighter weight carrier bags. WRAP also warned that local authorities could spend more money administering the tax than the tax would generate. As a result of these findings, Parliament's Environment Committee concluded that the benefits of the proposal would be "highly marginal." In October of 2006, the bill was officially withdrawn (although recent press accounts suggest the bill may be resubmitted in the near future).

What can be learned from the Irish PlasTax experience that is relevant for the proposed Seattle program? First, although the Irish program resulted in an almost immediate reduction in the use of plastic grocery bags, there have been costs as well as benefits, and it is difficult to determine (even now) whether the net gains from the program have been positive. Second, some impacts of the Irish PlasTax program were unexpected. It is doubtful, for example, that the increase in theft or the possibility that total plastic consumption might increase were widely anticipated. Third, it is entirely possible that the PlasTax program has not had a noticeable impact on energy consumption, overall plastic usage, litter, or landfill pressures. Consider, for example, the impacts of the program on oil consumption. Supporters of the program suggest that reduced production of plastic grocery bags has resulted in a saving of about 4.8 million gallons of oil. This is roughly one-quarter the amount of petroleum used in the state of Washington in a day.

Paper Bag Taxes

To our knowledge, there are no programs currently in effect that tax the use of paper garbage bags.¹⁸ We expect this tax, in combination with the tax on plastic grocery bags, to cause reduced consumption of both types of grocery bags. Consumers will find substitutes, the most obvious being reusable grocery bags. The Herrera study predicts that 54 percent of consumers will switch to such bags.¹⁹ Another substitute for some purposes may well be heavier weight plastic bags. To the extent the disposable paper and plastic bags are now being used as garbage bags by some consumers, we would expect such substitution to take place.²⁰ Accounts of the Irish PlasTax experience suggest this substitution has taken place there, although the extent of such substitution seems to be a contentious topic. The substitution of heavier-weight for lighter-weight plastic bags will act to offset any benefits of the reduced use of disposable plastic bags resulting from the tax. Whether the substitution of heavier-weight plastic bags for paper bags is good or bad from an environmental perspective is less clear (because the production of paper bags requires considerably more energy and materials than disposable plastic bags).

Estimates suggest that about 86 percent of paper bags are currently recycled in Seattle. Reduction in the use of paper bags will lead to fewer paper bags going into the recycling program.

Bans on Expanded Polystyrene Foam:

¹⁸ On February 27th, 2008 the Santa Monica City council voted unanimously to draft an ordinance under which paper bags would be allowed in the city if they meet certain recyclability thresholds, but they will be taxed. The deadline for drafting a bill was 60-90 days from the vote on the ordinance. At present, we have found no further information on the status of this bill.

¹⁹ See Appendix, p. N-6, table 8c.

²⁰ The Herrera study predicts that these impacts will be relatively small—roughly a 7 percent increase in garbage bags for those who use plastic bags and a 3 percent increase for those who use paper bags.

Seattle's program would not be the first to ban the sale of disposable food service items made of polystyrene foam (PSF).²¹ There are a number of California, East Coast, and European cities that have such bans.²² One of the first U.S. cities to impose such a ban was Portland, Oregon, where an ordinance banning PSF went into effect on January 1, 1990. It is informative to consider in detail some of the impacts of the Portland PSF ban.²³

The Portland ordinance banned the use of PSF by vendors of such food products as “bakery and deli products, fruits, vegetables, frozen yogurt, ice cream, coffee, tea, and soft drinks that are processed or prepared on site” (Hardy and Charles, p. 1). Major users of PSF that are exempt from the ban include school districts, hospitals, individuals, and non-profits.

The Portland ban has now been in effect for almost two decades. Our search for quantitative evidence or specific arguments regarding positive impacts of this program yielded little. A number of articles referred to the Portland ban as being effective, but provided no specifics, and a number of cities cited Portland's successful ban as a reason for them to enact a similar ban. A table in the 2008 Herrera report lists the following as positive aspects of product bans on polystyrene products in several U.S. cities:²⁴

1. Reduces litter.

²¹ The Portland ban is on the use of PSF products, whereas the proposed Seattle ban is on expanded polystyrene (EPS) foam products. Although there are technical differences in these products, from a layman's perspective, both are products commonly used in egg cartons, fast food cups, plates, and containers, and so forth. These products are frequently referred to as Styrofoam. STYROFOAM, however, is a brand trademarked by Dow Chemical Company, whose website (see <http://building.dow.com/styrofoam/what.htm>) indicates that “Today, the Dow STYROFOAM brand includes a variety of building materials (including insulated sheathing and housewrap), pipe insulation and floral and craft products. But there isn't a coffee cup, cooler or packaging material in the world made from STYROFOAM. These common disposable items are typically white in color and are made of expanded polystyrene beads. They do not provide the insulating value, compressive strength or moisture resistance properties of STYROFOAM products. In order to protect the Dow trademarked name ‘STYROFOAM’, such other material should be referred to by the generic term ‘foam’.” Accordingly, we use the terms polystyrene foam, PSF and EPS interchangeably in the discussion that follows and do not refer to these products as STYROFOAM.

²² Specific cities and counties with Styrofoam bans include Oakland, Berkeley, and San Francisco, as well as Suffolk and Glen Cove counties in New York.

²³ Much of the information in the following discussion of the Portland experience (especially the negative observations regarding its impacts) was obtained from the Cascade Policy Institute report by Hardy and Charles.

²⁴ See Appendixes A and B in Volume II of the Herrera report.

2. Reduces harmful effects on marine environment and marine life.
3. May reduce toxic emissions due to manufacture.

The Cascade Policy Institute published a report assessing the PSF ban in Portland not long after it was enacted, and in November 2007 updated that report (Hardy and Charles). The report, which is highly critical of the Portland ban, is the only source we found that systematically addressed various issues related to the ban. Among the points made in the report regarding the impacts of the Portland ban are the following:

Environmental impacts:

Proponents of the Portland ban continue to point to environmental gains from the program. Opponents, who claim that the ban may actually be detrimental to the environment, counter with the following arguments:

1. Originally, it was argued that PSF production released harmful chloroflourocarbons (CFCs) that resulted in depletion of stratospheric ozone. Research from the late 1980s suggested, however, that the vast majority (90 percent) of all foam cups were never made with CFCs. Moreover, foam products made with CFCs comprised a very small portion (less than 2 percent) of total CFC use in the United States. Finally, CFCs have not been used in the production of PSF since the early 1990s.
2. The ban was enacted during a period when landfill capacity for the Portland area was rapidly being exhausted. When a long-term contract for use of a landfill in Eastern Oregon was signed, however, this issue lost its relevance. In addition, research from the early 1990s has shown that, on average, all types of fast food containers comprise only about one-third of one percent of the volume of waste in landfills. More recent research by the EPA has found that all plastic nondurable plates and cups only make up about 0.4

percent of total garbage volume, and PSF products are only a fraction of these. Also, such major users of PSF products as non-profit organizations, schools, hospitals, and individuals are exempt from the ban. Thus, because PSF products are a very small fraction of all waste, because landfill capacity is not a pressing concern, and because many major PSF users are not impacted by the ban, the effects of the ban on Portland's garbage problem are probably inconsequential.

3. Proponents of the ban claimed that PSF could not be recycled and that products substituted for PSF would be recycled. In fact, PSF food containers were being recycled at the Portland-based Denton Plastics. This program was discontinued shortly after the PSF ban was implemented. Moreover, the paper products that were substituted for PSF were thrown away by consumers because they were not recyclable.²⁵ Although biodegradable paper packaging has been developed, research has found that such packaging breaks down very little in landfills, and the degradation that does occur may contaminate groundwater and produces methane. Further, Portland area vendors maintain that biodegradable packaging is too expensive to be economical at present.²⁶
4. Supporters of the PSF ban argued that it would result in reduced litter. Critics argue that PSF packaging has been replaced with paper and plastic products, which are just as likely to end up as litter as the PSF products. They suggest that beer bottles, pop cans, and gum wrappers continue to be discarded, and the litter problem continues today.

²⁵ A water-proof coating that is often petroleum based is required for paper products to hold liquids. This coating, combined with problems associated with food contamination, make it very difficult to recycle paper food service products.

²⁶ Hardy and Charles discuss in detail ongoing plastic/PSF recycling programs in the Portland area.

5. Advocates of the ban express concern that PSF may be harmful to wildlife. Research on this specific issue is inconclusive. Moreover, other plastic products that are more likely harmful to wildlife have not been banned.
6. Critics of the ban suggest that the adverse environmental impacts of products that have been substituted for PSF are greater than the impacts of PSF products. Evidence to support this argument is provided in a March 2006 study by Franklin Associates. That study employs a “life cycle analysis” approach, which quantifies the energy use and environmental emissions associated with a specific product. This study shows that in most (but not all) of the dimensions examined, PSF products are less harmful than food service products made of paper.²⁷ A further problem with the paper products is that because paper is not a very good insulator, customers often demand double cups or corrugated cup sleeves, thereby substantially increasing energy requirements and emissions associated with their use.

Economic Effects

1. Styrofoam cups cost much less than paper and plastic cups. Hardy and Charles report that in the Portland area, a 12 ounce PSF hot/cold cup costs 1.7 cents, a 12 ounce paper hot cup costs about 4.5 cents, and a clear plastic cups used by coffee shops costs about 7.7 cents. The estimated total direct cost to Portland food vendors resulting from not being allowed to use Styrofoam cups is about \$4 million annually.

²⁷ See Hardy and Charles, pp. 5-6 for summary details on the Franklin Associates study. In an earlier study, Hocking (1994) obtained similar results from a life cycle energy analysis. Paper cups were found to be much less efficient than foam cups. He also found that reusable ceramic, plastic, and glass cups would have to be used approximately 1000, 450, and 400 times respectively before they would become more energy efficient than disposable foam cups.

2. The cost estimate above does not account for the fact that because paper cups are poor insulators, many customers request double cups, extra napkins, or cup sleeves. Thus, one paper cup does not substitute for one PSF cup.

Additional Effects

1. The Portland law bans products “having a closed cell air capacity of 25 percent or greater, or a density of less than 0.787 grams per cubic centimeter.”²⁸ In laymen’s terms, this means that polystyrene products with a higher plastic component than PSF are allowed in Portland. Encouraging the use of products with more plastic (which implies increased resource usage) seems inconsistent with the intent of the ban.
2. Recycling technology for plastics in general, and PSF in particular, has advanced in the eighteen years since the Portland ban was implemented. A Portland-area recycling company now services about 70 cafeterias in area public school districts by distributing polystyrene cups, trays, plates, and forks and then picking up the same products and returning the used cups and trays to the distributor where they are used in the production of such products as construction blocks. Although the Portland Public School district (the PPS) is exempt from the PSF ban, the recycling company has not been able to work out a servicing agreement with the PPS. As a result, the PPS purchases its foam products from other suppliers, and students are instructed to simply throw away their plates, cups, and so forth. It seems ironic that students in the heart of Portland engage in such behavior, when similar behavior at a private company is either prohibited (by not allowing the use of PSF in the first place) or would likely be deemed unacceptable.

²⁸ Portland City Code, Chapter 9.28.

The impacts of the Portland ban were summed up by a Portland-based distributor of food packaging as “We sell a product that costs two-and-a-half times as much (as PSF), doesn’t have the same insulation value and ends up in the same landfill.”

IV. Conclusions and Recommendations

We have described the “PlasTaxPlus” program that has been proposed for Seattle. Our examination of the experiences of other cities, states, and countries with programs that tax or ban specified types of disposable grocery bags and foam food service containers focused on the two such programs that have been discussed the most—the Irish tax on plastic grocery bags and the ban on polystyrene food containers in Portland. Our review reveals the following with respect to each of the justifications for such programs that were listed in the first section of this report.

Stated Concern: CFC’s, which are harmful to stratospheric ozone, are used in the production of polystyrene foam. Banning the use of polystyrene food containers will have environmental benefits.

Our Finding: Research suggests that only a small proportion of all foam food containers were ever made with CFC’s. Further, foam products made with CFC’s comprised a very small proportion of total CFC use in the United States. Finally, CFC’s have not been used in the production of polystyrene foam since the early 1990s. Whether a ban on polystyrene foam food containers results in environmental benefits depends on what type of containers replace the banned foam. Most of the paper and plastic cups and plates currently available are considerably more expensive than the banned foam

products. They also require more energy and materials in their production, are not biodegradable, and are not generally recyclable. Although there is speculation that new cost-effective, biodegradable, and compostable products will be developed, such products are not currently available. Moreover, the fact that a product is recyclable, compostable, or biodegradable, does not mean that it will necessarily be recycled, composted, or that it will end up in an environment required for it to biodegrade.

Stated Concern: The public is increasingly concerned with global warming, climate change, fossil fuel consumption, and greenhouse gas emissions. Seattle's proposed program will result in a reduction in the production of disposable shopping bags (both plastic and paper) and polystyrene foam cups and clamshell containers. This, it is argued, will reduce greenhouse gas emissions and fossil fuel consumption.

Our Finding: An on-line characterization of the results of a study done for the Seattle Public Utilities suggests that the green fee on disposable shopping bags will reduce greenhouse gas emissions by about 4,000 tons per year. This, it is suggested, is the equivalent of taking 665 cars off the road. In 2007, there were about 1.8 million licensed vehicles in King county. Thus, the green fee will be equivalent to removing 0.04 percent (4/100ths of one percent) of the cars in King County from the road. Clearly, this effect will be too small to be noticeable.

We have seen no claims regarding greenhouse gas emission reductions resulting from the polystyrene foam ban. Nor do we expect any such gains. As indicated above, currently available plastic and paper food service products require more energy and materials to produce than polystyrene foam and are probably no more recyclable, biodegradable, or compostable.

Stated Concern: Landfill space is scarce, we are running out of it, and reductions in the use of disposable shopping bags and polystyrene foam containers will help to alleviate this problem.

Our Finding: There was concern over a dearth of landfill capacity in the 1980s. That concern turned out to be largely misplaced and there currently is a substantial inventory of unused landfill space in the United States as a whole. Seattle's solid waste is shipped by rail to Oregon under a contract that runs through 2028. It is projected that the Oregon region has landfill capacity that will last for at least forty years.

Stated Concern: Plastic and paper bags and polystyrene foam cups are important and highly visible components of roadside litter. The image, in particular, of plastic bags along the roadside or hooked on fences and waving in the wind is vivid in the public's minds. Prior to the implementation of a consumption tax in March 2002, plastic bags were reportedly so common

as litter in Ireland that they were referred to as the country's national flower. It is suggested that the visual pollution generated by these items will be reduced by green fees and bans.

Our Finding:

One of the authors of this report recently began a new exercise regimen. This regimen involved lengthy walks with his dogs through a number of Seattle's parks. Combining work with pleasure, he took an inventory of the number of plastic bags he observed as litter in these parks. In a six week period, during which he took roughly 30 five-mile walks along Lake Washington, he saw only six littered disposable plastic garbage bags. Two of those had been pulled from trash cans by crows. This casual empiricism suggests that the plastic-grocery-bags-as-litter problem may actually be relatively minor in much of Seattle. In support of this, studies from other areas have reported that plastic bags comprise a very small percentage of roadside litter. Moreover, the proposed programs do nothing to reduce littering of cigarette butts and packaging, gum and gum wrappers, beer and pop cans, paper cups and plates, or the other items that make up the vast majority of roadside litter. Under the polystyrene ban, the people who indiscriminately toss foam cups and plates from their car windows will have no incentive to behave differently with biodegradable and compostable paper or plastic cups and plates.

Consider next, Mayor Nickels' assessment that "The best way to handle a ton of waste is not to create it in the first place." A logical extension of this comment is "The best way to handle waste is not to create it." But waste is an unavoidable byproduct of our consumption. Not creating waste would require not consuming. The untenable implications of such a lifestyle are clear enough.

It is worth noting a few of the changes that have taken place in recent years in the packaging and container sectors as a result of private incentives and initiative. As mentioned above, the standard single use plastic grocery bag now requires 70 percent less plastic than twenty years ago. A recent article in *The Wall Street Journal* described ongoing successful efforts by beverage companies to reduce the amount of plastic used in their bottles, and to increase recycling rates, as well as the recycled content of their bottles.²⁹ The weight of aluminum cans has fallen by more than a third in the past thirty years.³⁰

Next, consider some additional costs associated with reduced usage of disposable plastic and paper grocery bags. A life cycle analysis conducted for the Australian government suggests that a year's worth of disposable plastic grocery bags requires roughly half the material, uses about 25 percent less primary energy, and generates about twice the greenhouse emissions as a comparable number of reusable canvas grocery bags.³¹ But suppose consumers purchase the requisite number of reusable canvas grocery bags for their needs and then lose them, or forget them at home. If they re-purchase new canvas bags once per year, then many the advantages of these bags are negated. A similar conclusion is drawn if, for convenience, both a husband and wife purchase a set of reusable canvas bags so that they each has reusable bags depending on

²⁹ See Betsy McKay, "Pepsi to Cut Plastic Used in Bottles," *The Wall Street Journal*, May 6, 2008, p. B2.

³⁰ See Benjamin, "The Eight Great Myths of Recycling" (Table 1) for additional similar examples of material and energy reducing developments in packaging.

³¹ See Nolan-ITU (2002).

who does the shopping. Alternatively, suppose a consumer forgets his reusable bags in his car and does not realize that he has forgotten them until he gets to the check out line. He can purchase more reusable bags, pay the green fee for plastic bags, or run to his car to get the forgotten canvas bags. In the latter case, he slows down the checkout process and imposes costs on those behind him in line. Estimates by the Australian Retailers Association suggest that implementation of a green fee will result in 3 to 5 seconds of extra time per purchase of ten items. The associated annual aggregate increase in operating costs is \$20 million.³²

In light of the discussion above, consider the last part of Mayor Nickels' quote from section I: "Taking a reusable bag to grocery stores and pharmacies is a simple thing that has an enormous impact." Whereas taking a reusable bag to the store is admittedly a "simple thing" to do, it is also one that is easily forgotten. Even occasional forgetfulness on the part of consumers has the potential to quickly negate the forecasted gains from substituting reusable bags for disposable bags. Moreover, although the proposed Seattle program will make some residents feel good, the benefits from the most optimistic forecasts regarding its impacts will be small enough that they will be unnoticeable.

Another important consideration involved with a shift from disposable plastic to reusable grocery bags relates to the fact that many of the reusable bags currently on the market are actually made of plastic. Whereas the disposable grocery bags are made of materials (type 2 plastic, or urethane) that can be (and are) recycled, most reusable bags are made of materials (type 5 plastic, or woven/flat sheet polypropylene) that are very difficult to recycle.³³

³²See "Inquiry into Plastic Bag Tax (Assessment and Collection) Bill 2002 and Plastic Bag (Minimisation of Usage) Education Fund Bill 2002," Submission to Senate Environment, Communications, Information Technology and the Arts Committee, Australian Retailers Association, June 2003.

³³ Our phone call to the Seattle Recycling Utility confirmed that they do not recycle these reusable bags.

What then, are our conclusions and recommendations regarding the proposed Seattle program? Our conclusion is that the proposed Seattle program will be largely symbolic and will have little or no noticeable impact on environmental quality in the Seattle area. The impacts of the green tax on greenhouse emissions will be miniscule, the volume of waste sent to the area landfill will not be measurably impacted, and roadside litter will be virtually unchanged. The polystyrene container ban may actually result in the use of materials that are more harmful to the environment than the cups, plates, and containers to be banned.

The Seattle program, if enacted, will be little more than a “feel good” program whose substantive benefits will likely be insignificant and whose costs may be considerable.³⁴ Surprisingly, in a meeting prior to the announcement of the proposed Seattle program the mayor’s office acknowledged that it is a feel good program. According to one person who attended the meeting, “the mayor’s office said a major reason for this tax is the public’s perception of plastic bags as a significant litter problem. They also stated while this is a public perception, plastic bags are simply not a significant part of the litter problem.”³⁵

Our recommendation is that the Seattle City Council should take a step back and reconsider the problems being addressed with the proposed program. Alternative solutions with comparable benefits and lower costs may be available. For example, most grocery retailers now have recycling bins for plastic grocery bags, and methods might be considered for encouraging the expansion of such programs.³⁶ This is essentially the tact that New York City is currently pursuing. In addition, polystyrene foam recycling efforts in Portland and elsewhere might be

³⁴ The Herrera report, in fact, suggests that the present value of the cost to households of the proposed program will be in excess of \$400 million over the next thirty years.

³⁵ Statement by Keith Lee, American Retail Supply, Kent, WA in “More Letters to the Editor,” at http://seattlepi.nwsource.com/opinion/359008_webltrs15.html (accessed June 24, 2008).

³⁶ Alternatively, it is not inconceivable that a careful benefit/cost analysis might reveal that plastic bags are an extremely economical and effective consumer product that does not create major environmental problems. One possibility is that the best program is no program.

examined and efforts might be made to encourage the development of such programs in the Seattle area. Moreover, the public good may be better served with programs that have the potential to have noticeable impacts. An obvious and growing problem in the Seattle area is traffic congestion. A program that reduced this congestion, even by 1 or 2 percent, would have impacts on greenhouse emissions several orders of magnitude larger than the proposed Seattle PlusTaxPlus program.

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