The Food Waste Disposer as a Municipal Tool for Waste Diversion

An Evaluation in Five Cities

Project Overview by InSinkErator

This publication is based on an InSinkErator-sponsored review of 432 households over a three year period and is provided for general informational and promotional purposes. Municipalities that are considering alternative waste diversion solutions are encouraged to consult with a qualified waste professional to analyze and consider all potential options.

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Introduction

The results from five cities conclude that food waste disposer use reduced the amount of discarded food waste by an average of about 30%, or about one-third. At that rate, after a 3-year period of disposer use, nearly a full year's worth of food waste would be kept out of landfills.

From 2012 to 2015, InSinkErator® initiated partnerships with five major cities across the United States in order to assess the viability of using food waste disposers as a municipal tool to manage food waste and accomplish what is known as "resource recovery."

These initiatives were launched to determine the impact of food waste disposers on reducing the volume of food waste discarded into the trash by a household. The five-city initiatives also sought to assess quality of life impacts on households and to measure municipal cost savings as a result of diverting a portion of food waste from landfills.

In short, the results were significant.

Experts examining data collected during the InSinkErator initiatives estimate that in the course of a week, discarded food waste decreased by an average of about 30% in the areas measured. At that rate, after a 3-year period of disposer use, about a full year's worth of food waste would be kept out of landfills.

This report provides a wide-range view of the results from initiatives **in Philadelphia, Chicago, Tacoma, Milwaukee and Boston, which affected 432 households and the lives and behaviors of the residents living in them.** It presents results that prove the value of food waste disposers extending beyond the home, to surrounding neighborhoods, greater metro areas and regions as a whole.

InSinkErator is proud of the initiatives summarized in this report. This undertaking – a unique public-private partnership of dedicated, creative and hard-working people – was made successful by the efforts of citizens and officials ranging from municipal executives and policy makers to staff and block captains, from community development groups and volunteers to plumbers.

Not to mention, the participants who opened their homes and kitchens to us.

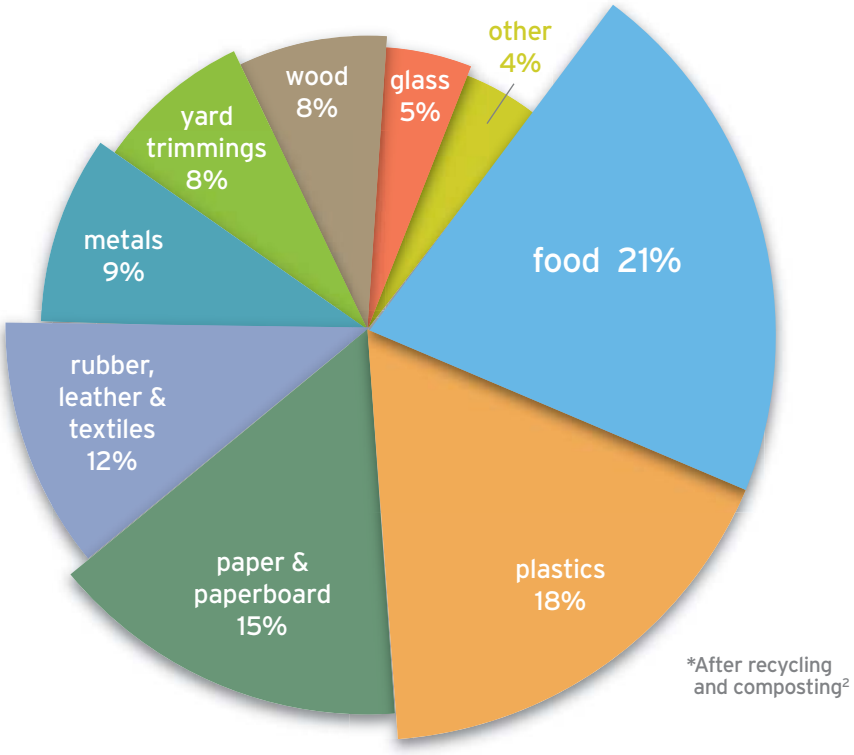
Background

According to the United States Environmental Protection Agency (USEPA) food waste is the largest percentage of municipal solid waste after recycling, with 35 million tons discarded each year. But with a disposer present in about half of all U.S. homes, **there is an opportunity for local governments to leverage the installed base of food waste disposers** to help reduce the volume of solid waste collected, hauled and disposed.

Because disposers convert food scraps into liquid slurry for transport via sewers to local wastewater treatment plants or septic systems, they may also serve as an aid to resource recovery of clean water, renewable energy and fertilizer at capable plants.

In areas served by capable treatment plants, disposers may be an aid to resource recovery resulting in renewable energy and fertilizer recycled from food waste.

2013 Composition of Municipal Solid Waste Discarded in the U.S. (EPA 2015)*



*After recycling and composting[2]

Project Description

To gauge the effect disposers can make on discarded waste, InSinkErator® measured the reduction in food waste after installation of a disposer in homes previously without one. Each of the five cities was chosen because it shared the goal of organics diversion from the solid waste stream and increasing resource recovery at their wastewater treatment plant.

The Project Steps:

Philadelphia's mayor helped kick off the media campaign to encourage and educate residents on the use of disposers.

Mayor Michael Nutter

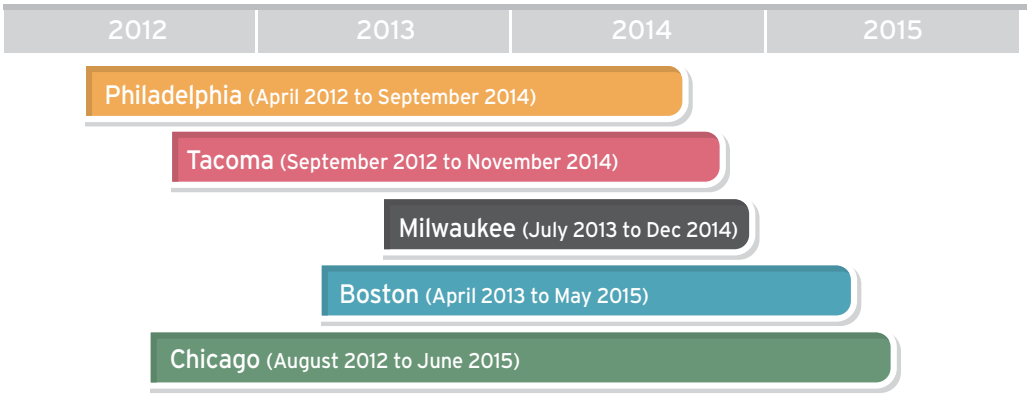
Participants & Timeline

InSinkErator® representatives met with city officials in each city to select the neighborhoods in which to conduct the study. For statistical reliability, a goal of ninety (90) participants in each neighborhood was set, the minimum was set at 70. Both goals proved to be a challenge given the widespread adoption of disposers in the U.S. In Philadelphia, two neighborhoods in close proximity were chosen as one large sample. In Boston, even though a smaller sample size was settled upon, every unit of the apartment complex received a disposer. In Tacoma, 90 homes agreed to get disposers, but fewer (63) eventually received them due to typical neighborhood turnover. In Chicago, while two areas were originally selected, one neighborhood was dropped due to low participation. Each participating household received a complimentary disposer and installation.

Neighborhood Participation by City

City	Neighborhood	Participating Households
Philadelphia, Pennsylvania	Point Breeze & West Oak Lane	173
Tacoma, Washington	Wapato Lake	63
Milwaukee, Wisconsin	Burnham Park	96
Boston, Massachusetts	Thomas Atkins Apartments	48
Chicago, Illinois	Maple Park	52

Timeline of Municipal Projects



Waste Diversion – Results and Impacts

Generation rates of municipal solid waste vary greatly from region to region, and even within a given location due to culture, diet, economics and other factors.

Consultants specializing in waste characterization were hired for the project evaluation, which included a series of waste measurements before and after the installation of disposers.

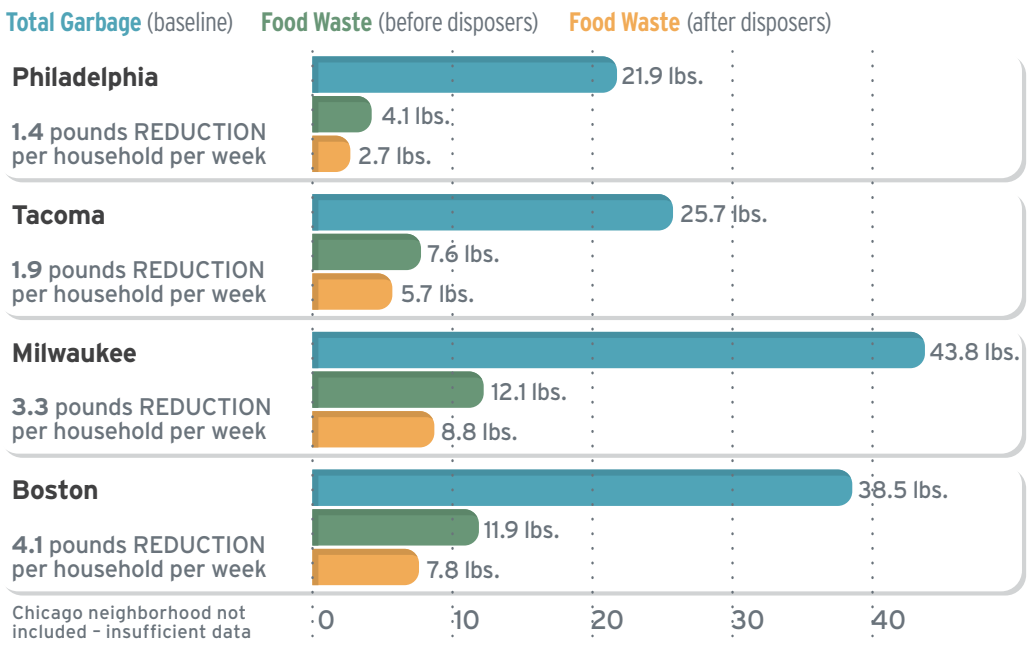
Professional Waste Consultants Utilized

Philadelphia, Pennsylvania	Mid Atlantic Solid Waste Consultants
Tacoma, Washington	Cascadia Consulting Group
Milwaukee, Wisconsin	Mid Atlantic Solid Waste Consultants
Boston, Massachusetts	Mid Atlantic Solid Waste Consultants
Chicago, Illinois	CDM Smith

Waste consultants concluded that on average, after the use of disposers, food waste in the trash was reduced by about 30%.*

The estimated amount of food waste processed by disposers was 1.4 to 4.1 pounds per household per week.

Project Results Weekly Household Waste Generation



*Reductions were calculated by measuring the food waste in the garbage. The actual amount of food waste processed by disposers not available.

The potential anticipated environmental implications of city-wide disposer use are shown below. By projecting the waste characterization data from each neighborhood to the whole city for a year, the total potential diversion was calculated for illustration purposes. Then, using a proprietary tool developed for InSinkErator® the potential reduction of greenhouse gas emissions due to food waste diversion was calculated. The potential increase in methane production at the wastewater treatment plant was also estimated. Each of the participating cities employed anaerobic digestion when the project was initiated.

Potential Environmental Implications

	Food waste diverted per household (pounds/week)	Total number of households citywide	Current disposer adoption rate	Potential mass of food waste diverted (tons) per year	Current solid waste management system	Reduction of greenhouse gas emissions (MT of CO_2e per year)	Additional methane production (ML per year)
Philadelphia, Pennsylvania	1.4	580,017	49%	21,113	waste-to energy	290	2,332
Tacoma, Washington	1.9	78,447	67%	3,875	landfill	4,770	428
Milwaukee, Wisconsin	3.2	440,000	52%	36,608	landfill	10,600	4,040
Boston, Massachusetts	4.1	890,000	55%	94,874	33% landfill & 67% WTE	11,900	10,479
Chicago, Illinois	NA	1,028,746	34%	NA	landfill	NA	NA

InSinkErator has not determined if citywide use is feasible; potential adoption rates should be considered when reviewing this report.

Results – Social & Quality of Life Impacts

Assessments were made via surveys, phone calls and focus groups, in addition to conversations with community leaders, volunteers and block captains.

For disposers to be considered a valid "tool" for cities to use in managing food waste, the residents must accept using them and be willing to incorporate them into daily behaviors. We questioned participants – each of which receiving a complimentary disposer and installation – about their satisfaction with disposers and any changes within the household and neighborhood about waste and reduction in pests, rodents and smells. Participants were also asked if they would recommend a disposer to a friend or relative and how likely they were to replace it at the end of its useful life.

These **assessments were taken via surveys, phone interviews and focus groups,** in addition to conversations with community leaders, volunteers and block captains.

Outreach & Education

Outreach ran the gamut from letters to flyers to garbage truck wraps.

Residents needed to be informed how to use disposers and what to grind. The installing plumber initiated this education at the time of install. All residents were later sent educational materials a minimum of eight times over the course of the months following installation. InSinkErator® Customer Service also phoned the residents. Materials were delivered via U.S. mail or face-to-face via door-knocking or at neighborhood parties and get-togethers. In Philadelphia, a media campaign followed the initial announcement of the program at a press conference sponsored by the mayor's office, generating numerous news stories. Radio ads, and robo-calls from the mayor's office were other forms of outreach employed.

In their surveys, residents said that, after the plumber, the most effective educational outreach came through neighborhood groups and volunteers.

Methodology

To establish a baseline, participants completed a survey assessing food waste habits at the beginning of the project, before disposer installation. A second survey was completed at the end of the study, a few months after installation. This timing was set to give residents opportunity to become familiar with the appliance and putting food waste down the drain.

Resident Populations Measured

A variety of populations were included in the study, ranging from a 48-unit apartment building of diverse, moderate income families in Boston to an urban, Hispanic neighborhood in Milwaukee.

Two focus group sessions were conducted in Philadelphia among project participants which provided additional insights beyond those revealed by the surveys.

A variety of populations were included. The neighborhoods were selected with the assistance of the city teams.

Survey Response Rates

Households Surveyed & Response Rates	Sent Survey	Returned Survey	Response Rate
Philadelphia, Pennsylvania	173	75	39%
Tacoma, Washington	63	41	68%
Milwaukee, Wisconsin	96	27	28%
Chicago, Illinois	52	19	37%

Boston not included due to insufficient data

Evolution PRO Compact®

Disposer Installation

In order to facilitate confidence and satisfaction and to encourage participants to grind all their food waste, InSinkErator® installed advanced performing Evolution PRO Compact® models. The project was put out for bid through local chapters of Plumbing Heating Cooling Contractors (PHCC) national association, which ultimately referred plumbers to InSinkErator. In Philadelphia and Boston, two of the plumbers hired were referred by the community development organizations.

Participant Satisfaction and Quality of Life

Participants were overwhelmingly happy with the use of their complimentary disposers, reporting they reduced trash disposed, made kitchen clean up easier, reduced odors and smells in the house and neighborhood, and limited vectors and pests. Participants reported that disposer use had a very positive impact on their lives. Comments made about the program included, "It was a blessing to me" and "Once you have a disposer you can't live without one."

"Once you have a disposer you can't live without one."
- Project Participant

Satisfaction of Project Participants, "Are you satisfied with how the disposer works?"*

Responses by City	Philadelphia, Pennsylvania	Tacoma, Washington	Chicago, Illinois	Milwaukee, Wisconsin
Very Satisfied	92%	90%	79%	93%
Somewhat Satisfied	7%	10%	16%	4%
Somewhat Dissatisfied	1%	0%	11%	4%
Very Dissatisfied	0%	0%	5%	0%

*Participants received a free disposer and installation.

The disposer also provided benefits beyond reduced trash: other benefits **included cleaner streets, less rodents and other animals going through trash, fewer bugs and pests and healthier kitchens. Residents also reported no longer needing to freeze their garbage until trash day, a common practice.**

Benefits of Disposer Use: "What was the best part of having a disposer?"*

Responses by City	Philadelphia, Pennsylvania	Tacoma, Washington	Chicago, Illinois
Less trash	68%	68%	68%
Cleaner kitchen	55%	65%	21%
Less smells in kitchen	62%	60%	47%
Fewer bugs or pests	42%	38%	5%
Got me to recycle more	30%	25%	42%
Improved value of my home	27%	35%	16%
None	0%	0%	5%
Other	4%	3%	0%

After their complimentary disposer was installed by InSinkErator, most **participants reported using the disposer for all or nearly all of the food scraps that were previously disposed of in the trash**. The majority of respondents reported that they almost always use the disposer when preparing meals or cleaning up after them.

Overall Disposer Impacts on Food Disposal: "How do you manage food waste at home?"*

Change in Food Scrap Diversion (%of Total)	Philadelphia, Pennsylvania	Tacoma, Washington	Milwaukee, Wisconsin
Put pretty much all food scraps in the disposer	74%	74%	33%
Put about half the food scraps in the disposer	14%	15%	56%
Put a little of the food scraps in the disposer	7%	5%	4%

Most food scraps were now going down the disposer.

*Participants received a free disposer and installation.

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Decrease in Trash Disposal: "After you started using your disposer, which of the following applies?"*

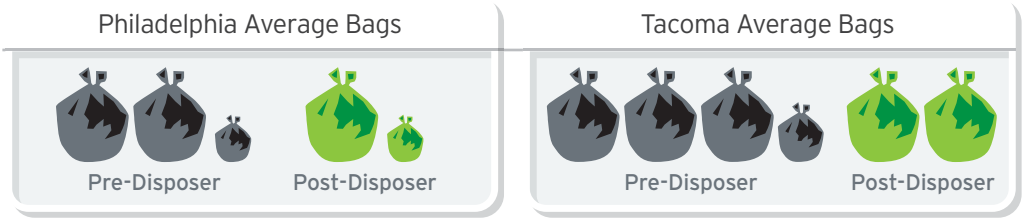
Responses by City	Philadelphia, Pennsylvania	Tacoma, Washington	Milwaukee, Wisconsin
Trash decreased a lot	58%	46%	56%
Trash decreased a little	29%	36%	33%
No difference in trash	12%	18%	4%
Trash increased a little	1%	0%	4%
Trash increased a lot	0%	0%	0%

30%

Approximate reduction in trash disposed.

Average number of bags set out Pre- vs. Post-Installation

Weekly Household Waste



*Participants received a free disposer and installation.

80%

Approximate number of participants who would recommend a disposer to a friend or family member.

Perhaps the most significant measure of satisfaction with disposers as a kitchen tool was summed up by the willingness of participants to recommend one.

Willingness to make personal recommendation to friend or family member*

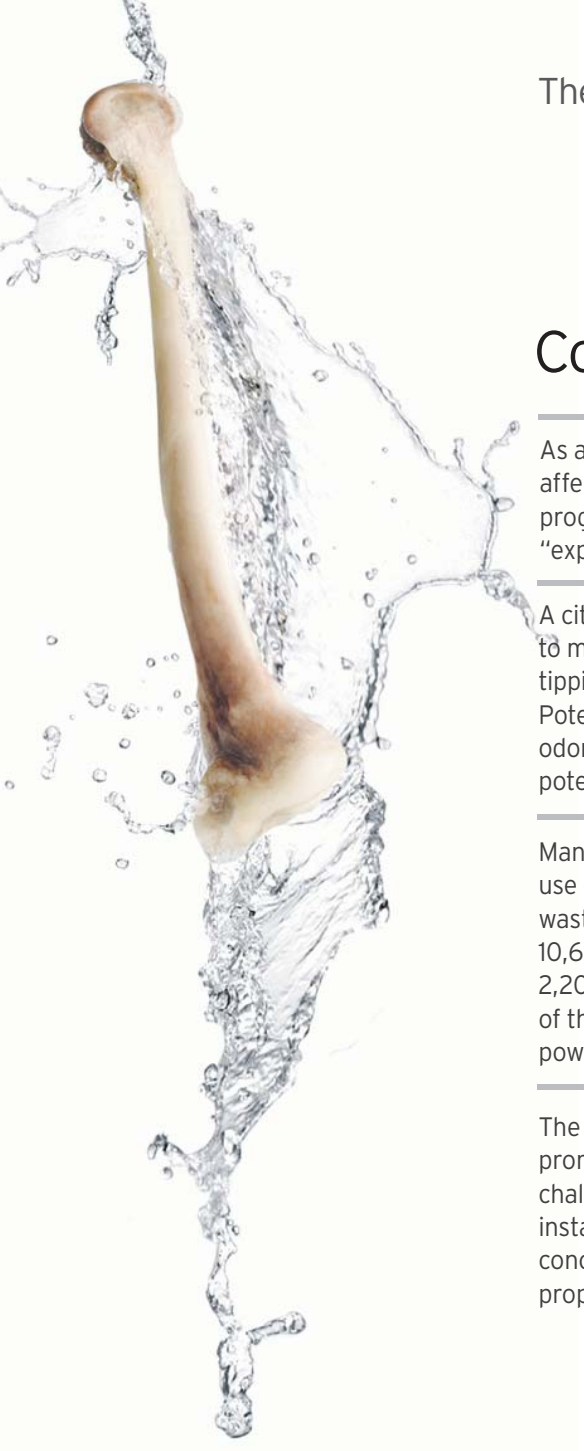
	Philadelphia, Pennsylvania	Tacoma, Washington
Yes, definitely would recommend to friend / family	80%	76%
Yes, probably would recommend to friend / family	18%	50%
No, would not recommend to friend / family	3%	22%

Additional Information Gathered

Participants reported that they now put all or nearly all of the acceptable food scraps down the disposer on a regular basis. They said they use the disposer for items such as peelings, fruits, vegetables, egg shells, grains, dairy and even for small bones, (fish and chicken) and seafood shells (shrimp and crab).

Structural barriers and property ownership present challenges. Focus group participants reported that one of the barriers faced by neighbors who wanted to participate in the study was the need for major plumbing work in order to install a disposal. Not being the property owner was cited as another barrier.

*Participants received a free disposer and installation.



Conclusions and Outlook

As a result of the municipal partnerships described in this report, resident behavior was affected in ways resembling acceptance and compliance with recycling and composting programs.[2] But we believe disposers are capable of much greater diversion, and even "experienced" users tend to under-utilize them.

A city may be able to realize significant potential savings when its residents use a disposer to manage organic waste. These savings include – but are not limited to – transport and tipping fees and the potential for increased biogas generation at treatment plants. Potential non-monetary benefits include cleaner, more pleasant cities largely free of odorous, rotting organic waste and the pests it attracts to neighborhoods. There is also potential for decreased greenhouse gases due to less transported waste in landfills.

Many – if not most – of these savings can be estimated. As an example, in Milwaukee, the use of food waste disposers to divert a potential 35,500 tons of food scraps annually to a wastewater plant with anaerobic digestion could result in the reduction of approximately 10,600 MT of CO_2e of greenhouse gas emissions and would be equivalent to removing 2,200 cars from the road for one year. The biogas produced from the anaerobic digestion of those food scraps at capable plants could potentially produce enough electricity to power 1,290 homes per year using GHG equivalences by the USEPA.

The cost of first-time disposer installation in existing housing, some of which is electrical, prompted InSinkErator® to cover installation costs. To overcome the first-time installation challenges, discussions continue regarding building code changes to mandate disposer installation in new residential construction and city-owned housing. Following the project's conclusion in Philadelphia, disposers were included in a building code as one option for property owners to comply with solid waste management.[3]

[1] Skumatz and Freeman. 2011. "Best Management Practices in Food Scraps Programs." U.S. EPA. http://www.foodscrapsrecovery.com/epa_foodwastereport_ei_region5_v11_final.pdf

[2] U.S. EPA. 2015. "Advancing Sustainable Materials Management: 2013 Fact Sheet. http://www.epa.gov/osw/nonhaz/municipal/pubs/2013_advncng_smm_fs.pdf

[3] City of Philadelphia. 2015. The Philadelphia Code - PM-308.3.1 Garbage facilities. American Legal Publishing Corporation. http://www.amlegal.com/nxt/gateway.dll/Pennsylvania/philadelphia_pa/title4thephiladelphiabuildingconstructio/subcodepmthephiladelphiapropertymaintena/chapter3generalrequirements0?f= templates$fn=default.htm$3.0$vid= amlegal:philadelphia_pa$anc=JD_PM-308.3.1

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Food waste disposers can provide an environmentally responsible alternative to transporting food waste to landfills. And they can help reduce greenhouse gas emissions. At capable wastewater treatment plants, food waste can be recycled into renewable energy. Additionally, capable wastewater treatment plants can process food waste into fertilizer. (Check the plant in your area.)

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