City and County of San Francisco
2019-2020 Civil Grand Jury

A Recycling Reality Check:

What Actually Happens to Things We Put in Our Blue Recycling Bins?

The Civil Grand Jury

The Civil Grand Jury is a government oversight panel of volunteers who serve for one year. It makes findings and recommendations resulting from its investigations.

Reports of the Civil Grand Jury do not identify individuals by name.
Disclosure of information about individuals interviewed by the jury is prohibited.
California Penal Code, section 929

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For each finding, the response must:

1) agree with the finding, or
2) disagree with it, wholly or partially, and explain why.

As to each recommendation the responding party must report that:

1) the recommendation has been implemented, with a summary explanation; or
2) the recommendation has not been implemented but will be within a set timeframe as provided; or
3) the recommendation requires further analysis. The officer or agency head must define what additional study is needed. The Grand Jury expects a progress report within six months; or
4) the recommendation will not be implemented because it is not warranted or reasonable, with an explanation.

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SUMMARY

Recycling and sustainability have long been hot topics in San Francisco, but misconceptions persist. In particular, there is little public understanding of what actually happens to the material we deposit in our blue recycling trash cans. Does it really get recycled, and if so where? Doesn't it just end up in a landfill, now that China won't take it? What can I do to improve the city's recycling performance? The 2019-2020 San Francisco Civil Grand Jury (SFCJG) investigated these questions.

In general, the SFCGJ found good news. San Francisco city government, in partnership with Recology (the monopoly processor of our blue bin material, or "BBM"), does ensure that roughly 80% of what goes into those bins is indeed recycled. This is one of the highest rates in the country[1], and should be commended (FINDING 1) given that most anything can be thrown in a blue bin, even things that obviously can't easily be recycled.

However, the SFCGJ found that more public communication of the disposition of the BBM is needed, so that citizens better understand that their efforts are paying off. To this end, we recommend that the San Francisco Department of the Environment (ENV) undertake new initiatives to make this information available to SF residents and businesses using both Internet website(s) and an existing mobile application. Also, we found that while significant educational efforts are being made, citizens still are unclear on what should be put into their blue bins, and what is the appropriate level of preparation that should be done to that material prior to disposal. This led to a recommendation that ENV endeavors to educate the public on what *not* to put in the blue bins.

This report will detail the following:

- The structure of the relationship between the City of San Francisco (in particular ENV) and Recology;
- Where the material placed in the blue bins ends up;
- What public communication vehicles are used to educate the public on the disposition of blue bin material; and
- A number of informational points related to the city's recycling, including:
    - What types and volume of material is the city actually recycling?
    - Where does recycling take place, and what are the business conditions related to that process?
    - What are the things most commonly put in the blue bins that cause real problems?

[1] Katie Brigham, "How San Francisco sends less trash to the landfill than any other major U.S. city", CNBC, July 14, 2018, https://www.cnbc.com/2018/07/13/how-san-francisco-became-a-global-leader-in-waste-management.html

- What can citizens and businesses do to increase our recycling performance?

The report will begin with a section of background information, followed by eight topics of interest to San Franciscans with respect to recycling, followed by Findings and Recommendations.

BACKGROUND

Unique Relationship between the City and Recology

The city of San Francisco depends on Recology to collect the city's refuse, and to recycle as much of that material as possible. The relationship between the city and Recology is atypical when compared with most other municipalities in the US. Most cities sign long-term (~10 year) contracts with private companies for commercial and residential waste disposal, including recycling. These contracts are tightly drawn up, and making changes to them mid-contract is usually challenging.

San Francisco is different. Under laws dating back to 1932[2], San Francisco licenses and permits refuse collection across the city. Back in the day, many small companies handled trash collection for small sections of the city, but these firms consolidated over time into what is now Recology[3]. Like utilities or public transport, trash collection is a "natural monopoly", that is, there isn't a strong financial case to be made for a fragmented market where multiple providers operate simultaneously. However like any monopoly situation, regulation and oversight is extremely important to avoid abuse of monopoly power.

The relationship between the City of San Francisco and Recology can roughly be split into two components:

- **Rate Setting**: Recology can request an adjustment to the rates they charge for waste collection at any time, though in practice they do so at roughly five year intervals. Rate setting is a complex process, involving multiple city departments, and takes roughly a year to complete.
- **Ongoing Operations**: Independent of the rate setting process, the city works with Recology on a continuous basis to handle tasks including aligning goals and monitoring performance, including recycling. SF Department of the Environment (ENV) is the primary city department that interfaces with Recology to discuss ongoing operations and provide oversight. They meet at least weekly and sometimes more frequently depending

[2] The 1932 ordinance: http://www.amlegal.com/pdffiles/sanfran/1932-11-08-Prop06.pdf
[3] Zero-Waste Case Study: San Francisco; US EPA, https://www.epa.gov/transforming-waste-tool/zero-waste-case-study-san-francisco

on circumstances[4]. Recology reports performance metrics to ENV and the Department of Public Health, including the rough distribution of recycling material processed by type.[5] Under the CalRecycle initiative,[6] quarterly and annual disposal data must be provided. The relationship between ENV and Recology has evolved over the years, but both entities informed SFCGJ members that the current relationship is largely cooperative.

Among the issues that ENV and Recology collaborate on is San Francisco's "Zero Waste" initiative. Currently, this initiative mandates working towards reducing waste generation by 15% and disposal by 50% by 2030. To that end, ENV works with Recology and the residential and commercial customers on disposal volume reduction, better separation of recyclables, and maximizing recovery of recyclable materials.

In the opinion of the EPA, the rather unique relationship between ENV and Recology has the advantages of strong policy leadership, and collaboration and flexibility with respect to rate setting. On the other hand, the disadvantages are that there is a greater dependency on the rate-making process, and limited competition.[7]

Processing Blue Bin Material

Since 2000, Recology has processed 100% of the residential and commercial blue bin material at its "Recycle Central" facility on Pier 96, in a warehouse leased to Recology by the city. Their trucks deposit an average of almost 500* tons of material every day at the facility. What happens next is basically a huge sorting exercise, to identify and separate the recyclable material into categories: cardboard, aluminum, etc. The material is sent through a series of high-volume machines that each have a specific sorting task. The sorted recyclable material is compressed into large bales, which are transported to processors that do the actual recycling into new products. What can't be identified as recyclable is landfilled. So Pier 96 isn't really a "recycling facility", it's a "sorting facility".

To understand the challenges of accurately sorting the blue bin material, it's crucial to keep in mind the scale of the operation. As it's hard to imagine what 500 tons of trash looks like, let's consider a simple mix of items we're familiar with. A beer bottle, 12 oz aluminum soda can, a single use plastic water bottle, and a medium sized Amazon box all together weigh about one pound. Pier 96 ingests roughly one million pounds of material a day. So if the incoming BBM

[4] A San Francisco ENV employee remarked to CGJ members "I talk to Recology every day."
[5] See for example Table 8 in:
https://sfpublicworks.org/sites/default/files/RY2018%20Q4%20Quarterly%20Report.pdf
[6] See https://www.calrecycle.ca.gov/
[7] Zero-Waste Case Study: San Francisco; US EPA,
https://www.epa.gov/transforming-waste-tool/zero-waste-case-study-san-francisco
*: While the peak daily amount of material approaches 650 tons, the daily average across a typical 7-day week is roughly 500 tons.

was all made up of our sample mix of items, four million items would need to be handled per day. When you have to handle that many items, two things become obvious:

- You have to automate heavily. It would be prohibitively expensive to try to do the work by hand; and
- You can't spend much time processing individual items. The material is racing along on conveyor belts at a jogging pace. So you can't take apart complex packages, unpack things that have been stuffed into a bag, or clean off contaminants.

Confusion Persists

Despite educational efforts by the city, some residents remain confused about what should be put in the blue bin.[8] While some items are obvious (e.g. an aluminum can), many are not. The roots of this confusion include inconsistency across municipalities, confusing labeling, and a lack of clarity about what is actually recyclable locally. And while on-line and printed resources are available to help, not everyone takes the time to look up every type of item they are unsure about. The result is that inappropriate material ends up being sent to Recycle Central at Pier 96. Recology attempts to remove as much of this material as possible during sorting, but inevitably some of it finds its way into the bales of recyclable output, contaminating it to some degree.

The SFCGJ's investigation centered on the processing and final disposition of blue bin material, and the corresponding public communication. We investigated the San Francisco Department of the Environment (ENV), and reviewed the operations of Recology with respect to processing of the material placed in the blue bins. We investigated the level of communication and outreach related to educating the public, identified common misconceptions about the process, and identified steps citizens can take to help optimize San Francisco's recycling effort.

METHODOLOGY

The SFGJ interviewed Recology and the San Francisco Department of the Environment, the primary city agency responsible for recycling oversight. The SFCGJ visited the recycling

[8] Confirmed during discussions with ENV and Recology. See also:
This New Resource Aims to Help Clear Up Recycling Confusion, Ensia, September 26, 2019, https://ensia.com/notable/recycling-confusion-labels-posters/
Recycling Tips: How To Avoid Throwing The Wrong Stuff In Your Bin, Huffpost, June 12, 2019, https://www.huffpost.com/entry/how-to-recycle_n_5cffdf18e4b02c23d2d282fd
Recycling in a Crisis, Recycle Across America, https://www.recycleacrossamerica.org/us-recycling-collapse

facility at Pier 96, and conducted multiple follow-up conversations with Recology staff to verify information. The SFCJG communicated with California state legislative assistants to understand the status of relevant bills currently under consideration. We also gathered extensive publically available material about the subject of recycling in general, and San Francisco's efforts in particular.

DEFINITION OF SCOPE

In this report the SFCGJ focused on two narrow topics:

- Where does the material we place in our blue recycling bins actually end up; and
- What does the city do to educate the public on where the blue bin material ends up?

In the course of our investigation, we learned a number of things about the recycling process that we felt would be valuable to include in our report, as the better educated we are about the process, the better we can participate in it. However, it should be emphasized that we kept the scope of the investigation narrow and didn't investigate any number of other topics related to recycling and material disposition. These include but are not limited to the following:

- Zero Waste initiative
- Previous or pending litigation
- Construction refuse disposition
- Disposition and composting of green bin material

DISCUSSION AND ANALYSIS

The balance of this report is organized as a series of topics that are unclear to many San Franciscans:

- How does one find out where the things I put in the blue bin actually go?
- Yes, our blue-bin material *does* get recycled!
- Where does the recycled material actually go?
- Welcome to the World of Pier 96: What recycles and what does not,
- Just Say NO…to contaminants!
- Wishful Recycling…It's a Thing!
- So YOU want to strike it rich recycling?! Good luck!
- Take it from the Top: Improving recycling at the source
- Think you're a recycling pro?! Take this quiz!

Before discussing these core questions, it is helpful to understand how the relationship between Recology and the city works, as this forms the backdrop for our recycling efforts. Unlike the arrangement in most other municipalities, Recology does not have a fixed term (e.g. 10 years) contract for trash collection. Rather, as long as Recology meets its service requirement obligations and maintains sufficient customer satisfaction, the relationship is open-ended. Rates are reviewed "as needed", which in practice means every five years. These rate reviews are requested by Recology and are to be expected given the ever-increasing cost of providing services. The rate process was last completed in 2017, is very complex, and takes the better part of a year. San Francisco trash collection rates, while not the very highest, do tend to be in the upper half to upper third of rates in the Bay Area. This is to be expected, as both labor and real estate costs are relatively high in San Francisco.

An advantage of the structure of the relationship with Recology is that it's beneficial for recycling efforts, because it means that Recology can invest in (expensive) processing equipment knowing that they will be working in the city long enough to make the investment worthwhile. This makes the relationship less contentious than it otherwise would be. In situations where a fixed contract is in place, if either side wants to change something mid-contract, the entire contract becomes open for re-negotiation, creating extra work and potential pitfalls. So while both types of relationships have their pros and cons, we found no evidence that, on balance, the arrangement in San Francisco has negatively affected our recycling efforts.

How does one find out where the things put in the blue bin actually go?

This question was the starting point for this SFCGJ investigation. We were concerned that the material placed in the blue bins might not end up being recycled at all. This is a common concern, as many public data sources and articles describe how recycling efforts have actually gone backwards over time[9]. Staff members at Recology confirmed that people often tell them that they are concerned that recyclable material is just being landfilled, and therefore there is little point in worrying about which bin to put it in. This is a serious issue, because effective recycling depends on the public to sort recyclable material – if we don't use the blue bins, we certainly aren't going to get much recycled.

The SFCGJ investigated whether city agencies answer the question about where material placed in the blue bins ends up. We sought to locate readily accessible, up-to-date data sources a resident or business could go to find out the ultimate destination of such material. Unfortunately, we found that this information is not easily obtained. No city department or agency, nor Recology, publishes this information for public consumption. The information is not on any publically accessible website, nor is it on the mobile application provided and supported by Recology.

We find this lack of information troubling (FINDING 2) because it undermines the confidence of residents in the recycling system and thereby retards the potential level of their support of the process. Two of our recommendations (RECOMMENDATIONS 1 AND 2) suggest that ENV remedy this deficiency by curating this data and making it available on both a public facing website and the existing Recology mobile application. We furthermore recommend that it be updated at least every six months as the situation changes over time. While we cannot guarantee that such information will be consumed by the public, we believe that such communication is the logical starting point to allay concerns about where the material goes, and in that way encourage better participation in the process. This will be crucial as San Francisco moves towards its next set of milestones on the path to zero waste.

[9] We're recycling but garbage keeps piling up: What you may not know about the recycling industry. Isabelle Philippe, ABC News, November 17, 2019, https://abcnews.go.com/Technology/recycling-garbage-piling-recycling-industry/story?id=66863085

Yes, our blue-bin material *does* get recycled!

One of the most common misconceptions is that the material that is thrown in the blue bins doesn't actually get recycled. Many people think that "because China isn't taking it anymore", or "there's no market for it", this material just ends up in landfill. This is incorrect. Recology, in partnership with ENV, does indeed recycle over 81%[10] of everything that is put in the blue bins. The remaining ~19% is not suitable to recycle, and is sent to landfill.

So what material is being recycled? To answer this question we need to understand that the market for recyclable materials changes over time. There is always a market for some items, but others may come and go, and prices can be volatile. The "primary" materials that are always sorted and sold for recycling by Recology are the following:

- Mixed paper
- Cardboard
- Aluminum
- Steel
- Glass
- PET (polyethylene terephthalate, the chemical name for polyester) 

- HDPE (High-density polyethylene) 

The "secondary" materials that may or may not be sorted and recycled are the less desirable plastics (codes 3 through 7[11]). This material can be baled as "Mixed Plastic" and sent to processors for recycling. The challenge is that there isn't always a market for Mixed Plastic – that is, no one wants it. While Recology rarely if ever landfills bales of Mixed Plastic, if there's no processor willing to buy such plastic, it makes no sense to sort and bale them. (Bales get dirty over time and take up space, so it's not a great idea to stockpile them.) Lastly, Polypropylene ("PP" or Type #5) has a much more consistent recycling market than Type 3, 4, 6, and 7. So when there isn't a market for Mixed Plastic, Recology will bale and sell Type 5 Polypropylene for recycling. Polypropylene is used in things like yogurt, soup and syrup containers.

[10] Based on summary data for 2019. Source: Recology
[11] For an explanation of plastic identification codes see https://en.wikipedia.org/wiki/Resin_identification_code

Where does the recycled material actually go?

Our investigation confirmed that there is a significant degree of confusion and unfamiliarity among San Francisco residents on the question of where material placed in the blue bins ultimately ends up. Many residents have heard of China's 2017 policy change to stop accepting refuse for recycling, but few understand the details and the implications. The first thing to understand is that recycling is an ever-changing landscape: What may be true today isn't true tomorrow. So be skeptical if you read that a particular type of material is going to a particular place: It might have been true at the time, but it no longer is. That said, as of Spring 2020, here's where the material is going:

Paper and Cardboard: Currently, there is only limited waste paper and cardboard recycling processing happening in the United States, relative to the global market. Recently, new plants have started to open (largely in response to China's change in policy and increased demand for cardboard for home deliveries), but many are on the east coast, which means high surface transport costs. Consequently, San Francisco's paper and cardboard is currently sent to multiple Asian countries (e.g. Malaysia and Indonesia) via the port of Oakland to be pulped[12], and the pulp is sold onward to other plants that turn it into new product. In the future, new plants coming on-line in the north-west U. S. may become viable destinations for our material, but that would require the material to be transported by truck, increasing both costs and environmental impact.

Steel and aluminum: These are processed domestically. Multiple foundries are broadly distributed across the country and produce a variety of goods with the material.

Glass: Glass is processed here in the Bay Area, in Fairfield, where it is turned into new glass bottles.

Plastics: The situation for plastics is more complex and dynamic. High value plastic (Types 1, 2, and 5) is recycled in domestic plants. Low-value plastic must be shipped to a variety of Asian countries to be recycled, including Malaysia, Vietnam, South Korea, and others. This happens because there is either no infrastructure or insufficient capacity for processing in the USA.

[12] For a technical primer on making pulp from waste paper, see "Waste Paper Pulp Making", CNBM International, http://www.paperpulpingmachine.com/applications/waste-paper-pulp-production-process/

San Francisco residents are also in the dark with respect to just how much of each type of material ends up in the blue bins. Currently San Francisco's distribution of material type being received at the Pier 96 facility is as follows:

Material	**Percentage of all blue bin recycling (by weight)**
Paper and Cardboard	75%
Glass	17.5%
Plastics	5%
Steel	1.5%
Aluminum	1%
Total	**100%**

This table makes it clear that the majority of recycling is paper and cardboard.

It should be noted that the SFCGJ received the above information via interviews with Recology staff. We were unable to find this information in the Recology app, Recology website, or the San Francisco Department of the Environment website.

Welcome to the World of Pier 96: What recycles and what does not

Are you ever unsure what can be recycled and what can't? You're not alone. There are so many possible combinations of material and contaminants that it's really difficult to be sure. However, it's much easier to figure out if you understand how recycling processing actually works in San Francisco. So let's get up close and personal with what goes on at Recycle Central on Pier 96.

The first thing to keep in mind is that each municipality has a different system for sorting recyclable material. Each city makes investments at different times, and since the technology changes quickly, that means the equipment purchased will vary. They also will have different priorities and budgets. So while it's common for people and news outlets to distribute recycling

information via the web or social media, the details may not apply to San Francisco's process. The bottom line is that you can't rely on information that's based on a different city. What applies in San Jose may not be true in San Francisco.

The second important consideration is the sheer volume of material that must be processed: almost 500 tons a day on average, and up to 650 tons on a busy day. There are only a small number of people working on the line at any one time, and their primary job is to pull out large pieces of material that can't be recycled. The material that is recycled is machine sorted, at very high speed. This means the material must be able to be automatically sorted, or it's unlikely to be recycled. Very small things will end up with the glass, while larger things are periodically cleared off the conveyor belts and sent to landfill.

Some municipalities go out of their way to inform the public what not to throw in the recycling bin. As an example, a paper flyer was sent to all residents of the Hammersmith and Fulham region of London in early 2020, explaining how to figure out what goes where. Fully half the flyer is dedicated to what not to recycle. And one part of the flyer says not to recycle "Any items not ticked in green". This greatly simplifies the thought process for residents: If you don't see it specifically listed, don't try to recycle it.

San Francisco has chosen not to go down the route taken by Hammersmith and Fulham to clearly delineate what should be put in the blue bin. This has the advantage of flexibility: All sorts of things will be thrown in the bin, which gives us at least the possibility to recycle it. The downside from the citizen's perspective is that it makes it more difficult to know what they should do.

In the opinion of the SFCGJ, the San Francisco Department of the Environment should maintain and publish a list of items that should *not* be placed in the blue bins (RECOMMENDATION 3). The focus should be on items a) Commonly discarded in the blue bins; b) Constitute a significant portion of the blue bin material, or create problems for the Recycle Central sorting system; and c) Unlikely to be recyclable over the medium term (two years).

As a result, based on San Francisco's sorting system at Pier 96, what are the things that really should be avoided in the blue bin? To start with, don't recycle Styrofoam and shredded paper. Styrofoam is double trouble: the facility doesn't collect it for recycling, and because it's so light, it can go flying off the conveyor belt and end up in the dark recesses of the building, or even worse, blow into the bay. Shredded paper has the same problem: it just flies all over the place and ends up tangled in the machinery or on the floor. So both should go in the black bin. However, note that Recology does have a special program for recycling Styrofoam: If you have

large pieces, you can take it to the Recology transfer station at 501 Tunnel Road, San Francisco, where special equipment can turn it into recyclable material.

Another consideration is the depth of the item. In the Pier 96 system, very flat material usually ends up being sorted as Mixed Paper. This means that anything that is flat but isn't paper should be avoided. The same is true of any material that is very small (well under an inch in all dimensions) and will either fly off the conveyor belt, or end up in the glass at the end of the process.

While these guidelines may be somewhat useful, what people really need is a simple way of figuring out what *should* go in the blue bin. Unfortunately, the answer to that question is a balance between "accuracy" and "simplicity" because trying to define exactly what to do becomes extremely complex, and changes over time. That said, the SFCGJ, in consultation with Recology, has come up with the following simple guideline:

> Only put an item in the blue bin if these two things are true:
> - The item consists of a single type of material that can be recycled (cardboard, paper, aluminum, glass, steel, or one type of plastic); and
> - The item is reasonably clean and dry. It can't be contaminated with food, chemicals and such. It doesn't have to be perfectly clean, but reasonably clean.

The first guideline says "single type" because Pier 96 can't take things apart to separate the different materials. For example let's say you went to Costco and bought a case of Coke, which is packaged in a cardboard tray, surrounded by plastic. You slice open the plastic at one end and pull out the cans of Coke. You obviously recycle the cans as you use them. Now you are left with cardboard surrounded by plastic. Pier 96 has no easy way to separate these two materials for proper sorting. So you should tear open the plastic, get the cardboard tray out, and put it in the blue bin. The plastic wrap should either be collected with other lightweight flexible plastic (e.g bags) until you have a basketball sized lump of it for the blue bin, or thrown away (black bin).

The second guideline is that the material is "clean and dry", which is required to minimize contaminants in the material to be recycled. We'll cover this topic next.

For more comprehensive advice, Recology and the San Francisco Department of the Environment have multiple online resources to help people figure out what goes in which bin. For general information about what goes in which bin, there are two options:

https://www.recology.com/recology-san-francisco/what-goes-where/

or at: https://sfrecycles.org/

For more specific advice, Recology has established an interactive page where you can type in a specific item and find out where it should go:

https://www.recology.com/recology-san-francisco/what-bin/ (Google "recology sf whatbin")

Just type in what you have to get rid of, and the website will tell you in which bin to put it. Give it a try: type in "pizza box" and you'll see it goes into the green bin.

Keep it Clean! Just Say NO to Contaminants!

One big reason why San Francisco is able to recycle such a large percentage of discarded material is that we work hard to keep our recyclable material clean. The typical requirement for processors to accept municipal recyclables is that contaminants be kept under 1% of the material.

So what sort of things contaminate our material? Assuming we are able to sort the material accurately, what's left of concern are primarily the following:

- Liquids (drinks, chemicals, etc)
- Food
- Any residue left over inside a container (shampoo, mustard, soap, etc).

Therefore, a simple rule of thumb is that the blue bin material *must be clean and dry*. It's really important to clean or rinse the item to be recycled before putting it in the blue bin if it needs it. It doesn't have to be perfectly clean (you don't have to put it in the dishwasher), but it needs to be reasonably clean. As a general rule all food and drink never goes in the blue bin; they belong in the green bin if feasible.

So, for example if you can rinse out the left-over peanut butter in a plastic jar, by all means do so and recycle the jar. On the other hand, if your (almost) empty bottle of dishwasher soap has a special cap which makes it impossible to rinse out, then it's not worth putting in the blue bin. It has to be landfilled, so put it in the black bin.

Wishful Recycling…It's a Thing

Have you ever looked at something you knew deep down was unlikely to be able to be recycled, but you put it in the blue bin hoping you were wrong? You're not alone! That's known in the business as "Wishful recycling", and yes, it's a thing. The term refers to anything that clearly is not in the list of acceptable items, or is in a form that makes it impossible to deal with[13].

One culprit that encourages wishful recycling is the recycling symbol that appears on all sorts of packaging:

It's completely reasonable to think "If I see the symbol, I can recycle it", but it's just not true. The Federal Trade Commission (FTC) interprets the symbol as indicating that a package is capable of being recycled *in areas where collection facilities for the material exist*. Furthermore, the FTC guidelines for using this symbol state that if there are no accompanying text or numbers, it means that the packaging is made of 100% recycled materials and is recyclable *in a substantial majority of U.S. communities*.[14] Obviously none of this provides any guarantee that the item can be recycled in *your* community! Since each municipality is capable of recycling different things, there's no way to guarantee that a particular type of material can be recycled in your town.

China's pre-2017 policy of accepting very poor quality material also contributed to the problem. Because it was easy for municipalities to ship such material to China, they had little incentive to educate and encourage proper sorting by citizens.[15] So off to China it went, and much of it ended up in rivers and oceans, as it couldn't be recycled. But now that China has changed its policies (and other Asian countries have followed suit) this is no longer the case.

Or consider this example: You buy a new mobile phone. The packaging consists of a wide variety of items: A colorful cardboard box; a plastic insert to hold the phone; a very small instruction booklet you're not going to keep; a wire twist-tie that held the charging cable; a couple of sticky plastic labels that you removed as you unpacked the phone. And so on. The bad news is that none of that is worth putting in the blue bin because it either can't be recycled, or is

[13] How To Cut Down On "Wishful Recycling", Global Trash Solutions(blog), Nov 30, 2018, globaltrashsolutions.com/blog/how-to-cut-down-on-wishful-recycling/
[14] Environmental Claims on Packaging, Alameda County, http://guides.stopwaste.org/packaging/avoiding-pitfalls/universal-recycling-symbol
[15] Edward Humes, "The US Recycling System Is Garbage", Sierra, June 26, 2019, https://www.sierraclub.org/sierra/2019-4-july-august/feature/us-recycling-system-garbage

too small to be sorted. You have this sinking feeling that this is the case, but all the same put all the bits and pieces back in the box, and throw the whole thing in the blue bin. Unfortunately, there isn't an army of humans or robots to handle this level of complexity.

Pier 96 staff deals with Wishful Recycling every day. Here are some real world examples – all things that have turned up at Pier 96:

- Running shoes and sandals
- Garden hoses
- Baby car seats
- Car bumpers
- Lawn furniture

Wishful recycling causes more harm than good. Throwing this material in the blue bin contaminates the inbound stream of recyclable material[16]. This can lead to less material being recycled because the contamination becomes too high. It also can be dangerous, if the item is hazardous to the people who sort the incoming material. Sometimes it gets stuck in the machinery, leading to downtime. Lithium-ion batteries cause minor fires. It clearly leads to greater expenses[17]which ends up leading to higher trash bills for citizens and businesses. The capacity of the overall system is reduced because some of that capacity is wasted dealing with material that shouldn't be there in the first place. For those reasons, it's better to just put such things in the black bin to be landfilled.

So YOU want to strike it rich recycling?! Good luck!

If you're interested in getting into a very volatile business, sorting and selling material for recycling is as good a choice as any. All municipalities have to deal with rapid swings in prices for recycling material. On the other hand, they have to make large capital investments in equipment in order to sort the material. This creates a big challenge for planning and budgeting, and San Francisco is no exception.

As an example, consider "Old corrugated containers" (OCC), a commonly recycled material. The national price for OCC went from $105 per ton in November 2017, to $25 per ton in June 2019.[18] At the same time, the quality requirements have increased: The OCC contaminant standard used to be 2% but now is 1%.

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[16] Nyssa Baechler, 'Wishful Recycling': More Harm Than Good, Currents: A Student Blog, Navigating Society And Sea (blog), W School Of Marine And Environmental Affairs, Feb 12, 2018, smea.uw.edu/currents/wishful-recycling-more-harm-than-good/

[17] Wishful Recycling, Sustainable Connections(blog), May02, 2020, sustainableconnections.org/wishful-recycling/

[18] Megan Smalley, "Working through the worst of times", Recycling Today, October 22, 2019, https://www.recyclingtoday.com/article/working-through-the-worst-of-recovered-paper-markets/

Many things have contributed to the volatility and uncertainty of recyclable materials. Prices fluctuate based on the economic cycle, as they did in the recession a decade ago. Prices vary based on location. Politics plays a role, in particular the decision by China and other Asian countries to stop taking foreign sourced, low-quality material and to impose tariffs[19]. China's decision to stop taking many types of material (the "National Sword Policy") was a huge shock to the market, as China was by far the largest purchaser of such material. China no longer accepts low-grade mixed paper but does accept higher grade material like double- sorted corrugated. But it's not that simple: If a US city sends a number of containers full of cardboard to China, one of the containers will be visually (not scientifically) inspected by government officials when they arrive. If the officials reject one container, the sending city will have to find a new buyer and pay to have all the containers shipped there. At that point they're losing money and impacting the environment with the additional transportation. Given the poor political climate between the two countries, this is a risk that may not be worth taking which decreases the potential number of buyers, and hence the price floor for the material.

Another challenging material is glass. At the end of Recology's Pier 96 processing, glass is collected, but it contains a lot of contaminants because there's no scalable way to remove tiny bits of junk that make it to this stage of the process. The glass processor has to pick out the usable glass and send the rest to landfill. Recology must pay the disposal fee for the contaminants, and the transport fees. So while Recology does receive a small payment for the glass itself, the associated costs outweigh the payment, and recycling glass is a net expense. This calculation doesn't include the CRV rebate (see below), which makes a significant difference. The point being made is that the recycling of glass as a "stand-alone" business isn't profitable.

And then there's plastic. PET and HDPE always have markets, but types 3 through 7 often do not, or the prices obtainable are very low. Because we generate so much plastic waste, municipal recycling efforts have a major burden sorting and disposing of it.

Below are the average rates for some of the most common materials. These are the actual prices received by Recology for 2019, and include CRV payments they receive as part of the CRV rebate program administered by the state for aluminum, glass, and plastic. Note that the CRV payments greatly increase the revenue received for those materials.

[19] "Recycling Industry Responds to China Tariffs on Paper, Plastics", Waste360, August 9, 2018, https://www.waste360.com/business/recycling-industry-responds-china-tariffs-paper-plastics

Material	Price per Ton
Mixed Paper	$25
Cardboard	$88
PET Plastic	$744
Aluminum	$3,627
Steel	$85
Glass	$138

Source: Recology

These figures do not show the volatility of the prices. More detailed analysis showed that during 2019, individual monthly commodity prices swung as much as 56% above and 36% below the average for the year.

The conclusion is that it is unrealistic to think of municipal recyclables sorting as a profitable business. It is true that certain material (e.g. aluminum and certain plastics) is definitely profitable. But when the entire processing and disposal chain is considered, along with capital investment requirements and business risk, the bottom line is that recycling is something municipalities do because it reduces landfill volume and decreases the burden we place on our environment. It's not realistic to assume that the revenue from selling the material will even offset the cost of the effort, let alone generate a viable return on investment. This may of course change over time, but it is the situation currently.

Take it from the Top: Improving Recycling at the Source

Here's a trick question: How do you recycle packaging that uses materials that can't be recycled? Answer: You don't! While it's true you can come up with innovative solutions, such as turning a ketchup bottle into a flower pot, those solutions simply don't scale. Instead, what's needed is to

encourage and incentivize the packaging producers to take more responsibility for the problem, and create packaging that's viable to recycle.

So why don't producers already do this? Because there are good reasons for them to use non-recyclable packaging, and little incentive not to. Specifically, packaging can make the overall product more attractive or differentiated, and it can reduce costs. To those ends, producers do two things that negatively impact the city's ability to recycle their packaging:

- They combine materials in such a way that they can't realistically be recycled. Remember that ketchup bottle? Ever notice how "silky" it looks? That's because it's a blend of a number of different plastics, the result being that it's very difficult to recycle. Individual tea bag envelopes, toothpaste tubes, and potato chip bags have the same problem, combining plastics with non-plastics.
- Packaging producers have created a huge variety of plastics, including exotic types that can't be realistically recycled at scale. It is simply not true that all plastics in use fit neatly into those numbered categories in the recycling symbol. So the package may indeed be made of a single material, but that material can't be recycled.

Efforts to improve this situation are a component of a broader term known as "sustainable packaging"[20], and it will take time for these efforts to bear fruit. In the meantime, San Franciscans can do three things to help improve the immediate situation:

- Alter our buying choices based on the package. For example, avoid plastic. Choose glass over plastic, for example for pickle relish or mustard. And definitely avoid flimsy plastic such as bags and film – this material is next to impossible to recycle at scale.
- If you have to buy something wrapped in plastic, favor plastic codes 1 and 2, as San Francisco's municipal recycling system always recycles these materials. For example, many "clamshell" packages are made of PET (code 1). Just make sure they are clean, and deposited where they will actually be recycled.
- Social media makes it relatively easy for consumers to make their opinion known to the producers. Pressuring them to change their ways may eventually have an effect.

Longer term, legal changes will be needed to push the costs of packaging choices back onto the producers, or to force more use of recyclable materials. This is a parallel effort to the more

[20] Wikipedia, "Sustainable Packaging", https://en.wikipedia.org/wiki/Sustainable_packaging

well-known laws that simply prohibit certain items such as plastic straws or bags.[21] The California state legislature has been working on proposed legislation that would require single-use packaging to be recyclable: "SB-54 / AB-1080: Solid waste: packaging and products". However this is still a "work in progress" and is not yet law. If the legislation is not approved by the end of August 2020 (the end of the legislative session), bills are effectively "dead" for the year.[22] San Franciscans concerned about this topic should consider letting their state representatives know how they feel about it.

Think you're a recycling pro?! Take this quiz!

San Francisco takes recycling seriously and that includes a lot of its citizens. Think you're one of those people who can correctly identify recycling opportunities like Steph Curry hits three-pointers? Take this quiz to find out how good you really are! *The answers are in the Appendix*

	Item	**Correct Bin (Blue, Green, Black)**
1	Used pizza box	
2	Milk or orange juice carton ("aseptic" cartons)	
3	Potato chip bag or granola bar wrapper	
4	Used tin foil	
5	A plastic bag (e.g. for holding lose vegetables)	
6	White Amazon pouch (or any padded envelope)	

[21] Megan Smalley, "Year packed with packaging regulations", Recycling Today, September 12, 2019, https://www.recyclingtoday.com/article/northeast-recycling-council-webinar-extended-producer-responsibility-packaging-laws/

[22] State of California, "California Legislative Information: AB-1080", https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200AB1080

7	Wine cork	
8	Plastic utensils (not the compostable type)	
9	Clothing	
10	To-go coffee cup, sleeve, and rigid plastic lid	

Conclusion

Recycling at the municipal level isn't particularly complex, but it is a dynamic business and is not done consistently, even between cities in the same county. There is a level of complexity in the details however, for example when it comes to the use of plastics in packaging. Overall, the SFCGJ was impressed with several aspects of the city's recycling program and the team that supports it:

- The high rate of recycling relative to other cities in the United States;
- The commitment of both the San Francisco Department of the Environment and Recology towards recycling;
- The generally positive relationship between the San Francisco Department of the Environment and Recology; and
- The availability, depth of knowledge, and candor of staff at both Recology and the San Francisco Department of the Environment

The SFCGJ does feel that Recology and the San Francisco Department of the Environment should increase their level of communication and public awareness with respect to the disposition of recycled material, as it will encourage citizens to take recycling even more seriously. It *appears* vaguely suspicious that there is plenty of information on how the public is supposed to recycle, but very little information on what actually happens as a result of their actions. We believe this appearance is unintended and benign, but the optics do count. If a person knows that his or her choices will lead to better environmental outcomes and lower waste disposal rates, he or she is more likely to take the time to become well informed and make the right decisions.

FINDINGS

Based on the facts set forth above, the Civil Grand Jury highlights here its principal Findings.

Finding #	Findings	Required Responses
1	San Francisco Department of the Environment and Recology are to be commended for their commitment to maximizing the effectiveness of their recycling efforts. San Francisco sets a positive, powerful example for how a commitment to recycling can pay off in the form of reduced landfill use.	(i) San Francisco Department of the Environment (ii) Mayor's Office (iii) Board of Supervisors
2	San Francisco Department of the Environment and Recology do not provide a sufficient amount of timely information to the public related to the disposition of material placed in the blue bins.	(i) San Francisco Department of the Environment (ii) Mayor's Office (iii) Board of Supervisors
3	While significant efforts are being made by the San Francisco Department of the Environment and Recology, many residents still struggle to understand what belongs in the blue bin and what does not.	(i) San Francisco Department of the Environment (ii) Mayor's Office (iii) Board of Supervisors

RECOMMENDATIONS

Pursuant to the above Findings, the Civil Grand Jury recommends the following actions.

Recommendation #	Recommendation	Associated Findings	Required Responses
1	City government should establish a web page (available on both Recology SF and the San Francisco Department of the Environment sites) that summarizes the recent disposition of blue bin material. The website should be updated not less than twice a year, with data for the preceding six months. Key trends should be identified in simple language or graphical elements.	F2	(i) San Francisco Department of the Environment (ii) Mayor's Office (iii) Board of Supervisors
2	The existing mobile application related to recycling (https://play.google.com/store/apps/details?id=com.recology.android) should be updated to provide information that summarizes the recent disposition of blue bin material. The information should be refreshed not less than twice a year, with data for the preceding six months. Key trends should be identified in simple language or graphical elements.	F2	(i) San Francisco Department of the Environment (ii) Mayor's Office (iii) Board of Supervisors

3	City government should enhance citizen educational efforts on what *not* to place in the blue bins, so that the volume, quality, and associated revenue from blue bin recycling can be increased, while decreasing the confusion some citizens have on this topic.	F3	(i) San Francisco Department of the Environment (ii) Mayor's Office (iii) Board of Supervisors

REQUIRED RESPONSES

Pursuant to Penal code section 933.05, the Civil Grand Jury requests responses as follows:

Required Respondents	Findings	Recommendations
San Francisco Department of the Environment	F1, F2, F3	R1, R2, R3
Mayor's Office	F1, F2, F3	R1, R2, R3
Board of Supervisors	F1, F2, F3	R1, R2, R3

APPENDIX

Representative/Illustrative Newspaper Articles

https://www.fastcompany.com/90482128/how-americas-least-sustainable-city-learned-to-love-recycling?utm_campaign=eem524%3A524%3As00%3A20200327_fc&utm_medium=Compass&utm_source=newsletter

https://www.consumerwatchdog.org/report/trashed-how-california-recycling-failed-and-how-fix-it

https://issuu.com/daniellegambogi/docs/sustainability_report_issuu_3-88?fr=sMDE5OTU5OTY4Nw

https://www.fastcompany.com/90456454/inside-adidas-ambitious-plan-to-end-plastic-waste-in-a-decade?utm_campaign=eem524%3A524%3As00%3A20200128_fc&utm_medium=Compass&utm_source=newsletter

https://www.epa.gov/transforming-waste-tool/zero-waste-case-study-san-francisco

https://www.surfsantamonica.com/ssm_site/the_lookout/news/News-2015/March-2015/03_16_2015_Santa_Monicas_Strives_for_Zero_Waste_with_New_App.html

The major source of ocean plastic pollution you've probably never heard of, The Conversation, Feb. 14, 2019

It is time to cut use of plastics**,** San Francisco Chronicle, Monday, December 24, 2018, by Michael J. Sangiacomo, President and CEO of Recology

Inside the long war to protect plastic, The Center for Public Integrity, May 16

Report: Impact of Plastics Reveals "Severe" Climate Damage, Waste360, May 21

Experts say many whales die from plastic**,** VOX, May 25

Monterey Bay is a natural wonder – poisoned with microplastic**,** Wired.com, June 6

Tiny plastic pieces are spread throughout the deep sea**,** National Geographic, June 6

California takes on an ocean of plastic waste, considers crackdown on industry**,** SF Chronicle, June 12

Canada Plans to Ban Single-Use Plastics, Joining Growing Global Movement**,** New York Times, June 10

As the world grapples with plastic, the US makes more of it — a lot more**,** The Center for Public integrity, June 13

Vermont follows 127 nations that taxed or banned plastic bags, National Geographic, June 18

Upset about the plastic crisis? Stop trying so hard, The Guardian, June 24, by Roland Geyer

Big Oil Plans to Unleash a Wave of Plastic From the Gulf Coast**,** Bloomberg News, July 10

As plastics foul the world's oceans, world leaders struggle over how to respond**,** The Washington Post, July 18, 2019

How the Plastics Industry is Fighting to Keep Polluting The World**,** The Intercept, July 20, 2019

It's now raining plastic, Colorado Public Radio, July 26, 2019

As plastic bans spread, industry went on attack, Houston Chronicle, July 31, 2019

A plastic bottle ban that's so crazy it just might work, Los Angeles Times, August 9. 2019, by the Times Editorial Board

We're choking on plastic. California must take the lead in reducing its use**,** CalMatters, August 12, 2019

Recycling won't save us — using less plastic is our only option, Los Angeles Times, Aug. 13, 2019

We're Drowning in Plastic – the California Legislature Aims to Do Something About It**,** OB Rag, serving Ocean Beach, the Peninsula, and San Diego Beaches, August 13, 2019

How to Eat Less Plastic, Consumer Reports, August 13, 2019

Plastic particles falling out of sky with snow in Arctic, BBC News, August 14, 2019,

Plastic bags are killing horses and cows across the state. What's Texas to do?, Texas Tribune, August 14, 2019

It's in Business' Interest to Back California Single-Use Plastic Legislation, Union Tribune, August 14, 2019

How a state senator blocked Pennsylvania bans on plastic bags, Morning Call., August 14, 2019

Plastic Utensils Are a Now Top Five Beach Polluter, Food and Wine, September 3, 2019

Lake Tahoe is latest victim of our addiction to plastics, San Francisco Chronicle, Sept. 1, 2019

Plastic Utensils Are a Now Top Five Beach Polluter, Ocean Conservancy Says, Food and Wine, Sept. 3, 2019

Visualizing the world's addiction to plastic bottles (stunning graphic), Reuters, September 4, 2019

San Francisco is surviving the global recycling crisis. But it's not easy
SF Chronicle, Monday, September 09, 2019, by Elena Shao

McDonald's Is Testing Plastic-Free Concept Stores, Food and Wine, September 10, 2019

California should phase out use of plastics that aren't recyclable, Mercury News & East Bay Times Editorial Boards, September 10, 2019

How California can create a future free of unnecessary plastic waste, Mercury News, September 11, 2019, by Julie Packard, Executive Director of the Monterey Bay Aquarium

California considering toughest plastic pollution laws in United States, Mercury News, Wednesday, September 12, 2019

Plea against plastics, News Review, September 12, 2019

Today's Special: Grilled Salmon Laced With Plastic**,** Mother Jones, Thursday, September 12, 2019

Where Does All the Plastic Go?, The New Yorker, September 17, 2019

Most Plastic Products Contain Potentially Toxic Chemicals, Study Reveals**,** Consumer Reports, Sept. 17, 2019

Three-quarters of plastic products are toxic, Fast Company, Sept. 18, 2019

Appendix A

Answers to Quiz

	Item	**Correct Bin** **(Blue, Green, Black)**
1	Used pizza box	Green. Or for the real pros: rip off the (clean) lid and put it in blue, put the rest (dirty) in green.
2	Milk or orange juice carton (“aseptic” cartons)	Blue
3	Potato chip bag or granola bar wrapper	Black
4	Used tin foil	Blue, if it’s clean, you can collect enough to make a ball of it the size of a baseball. Otherwise black
5	A plastic bag (e.g. for holding lose vegetables)	Blue, if you can collect enough to make a ball of it the size of a basketball. Otherwise black
6	White Amazon pouch (or any padded envelope)	Black
7	Wine cork	Green
8	Plastic utensils	Black (or clean and re-use)
9	Clothing	Black (or donation if usable)
10	To-go coffee cup, sleeve, and rigid plastic lid	All in blue; just make sure they aren’t very wet.