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The Costs and Benefits of Minnesota K-12 School Waste Management Programs

FINAL REPORT

Prepared for:

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ABSTRACT

The State has produced a number of previous studies designed to help Minnesota K-12 public schools reduce solid waste and increase diversion through recycling and composting. This study uses information from surveys, invoices, and on-site visits to examine the economics of these types of changes on Schools and Districts. This study, conducted by Skumatz Economic Research Associates (SERA) with assistance from JL Taitt & Associates, conducted three main activities to analyze practices, costs, and the economic realities of recycling in State schools: examined more than 150 surveys from schools and Districts from 56 counties; analyzed more than 500 invoices from Schools and Districts around the State; and conducted visits to 21 schools across all grade levels in 15 Districts in eleven counties to assess practices, diversion, and costs.

Recycling is present in nearly all schools, but organics programs have been implemented less commonly (about one-quarter of Districts responding to the survey). Two factors were found to be related to the presence of organics programs: decision-making at the District-level, and stronger "economics" for diversion. Organics programs were more common in Districts in those counties with extra solid waste taxes / fees beyond the State's trash tax than Schools or Districts in other counties (specifically, Ramsay, Hennepin, Anoka, Stearns, Winona, St. Louis, Washington, and Nobles Counties assess an additional tax on landfilled tons in addition to the Statewide tax); the extra costs for trash disposal worked to improve the economics of diversion for schools.

Schools have taken on many activities, beyond basic classroom activities, that tend to increase the volume and diversity of waste generated. Full- or limited- service kitchens and a host of athletic and before/after school events with meals and home-ec classes contribute organics; vending machines, shop classes, and community education and events and many other activities contribute a variety of recyclables. Most survey respondents reported more than one of these activities, increasing the diversity of materials to the waste generated from Schools and Districts. Opportunities for additional diversion from these activities has been discussed in previous reports, and this report provides a table of more than 60 "best practices" diversion strategies for reference for schools facing barriers related to size, hauler practices, and other complicating conditions. On-site work identified additional factors that have helped divert waste within leading schools around the state, including: District leadership and top-down support for recycling in schools, which helps make a climate for recycling that is sustained over time; adult direction and supervision of student participation, and use of opportunities to increase student awareness and education about recycling to enhance the program and participation; and installation of well-designed in-building container systems, with strong signage, and color-coding to improve convenience and clarify the recycling message.

The work analyzing invoices, contracts, and costs identified several messages regarding the economics of recycling. Reviewing invoices from 10 of the on-sites, all but one (90%) saved money by recycling, and all but one would save even more money by recycling more. An analysis of the three on-site schools with organics data indicated that organics increased overall solid waste bills; however, for two schools the cost of hauler collection was lower with organics, but the cost of liner bags for the organics containers pushed the overall cost higher than for trash-and-recycling (without organics). A statistical analysis across hundreds of hauler invoices for schools and Districts around the State showed that the per-cubic-yard cost for recycling is comparable to or less than the cost for trash collection, making recycling cost-effective. However, this is not the case for organics. Organics is less costly than trash in the counties with the extra solid waste tax, which indicates additional potential in those counties, but costs (considerably) more than trash in the counties without the extra tax. This makes organics programs more difficult economically for Schools and Districts in these non-Metro counties. The invoice and contracts analysis further notes that many Schools do not make solid waste decisions. In many cases, Districts are responsible for solid waste contracts, bidding, and service decisions, so savings from recycling accrue to the Districts and not the schools themselves, limiting links between savings and behavior. Many schools and districts do not have copies of the contracts, or are unfamiliar with their clauses (including pricing, inflation, and roll-over clauses). Schools and Districts would benefit – and receive savings – if they put out service for re-bid every few years, allowing regular opportunities for competitive bidding, allowing integration of more services (trash and recycling and/or organics), establishment of favorable contract conditions, and "rightsizing" of the School and District trash, recycling, and organics service levels for best pricing.

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SECTION 1: EXECUTIVE SUMMARY AND RECOMMENDATIONS

State and local governments have provided a significant amount of technical assistance and consultation services to help Minnesota K-12 public Schools reduce waste, enhance recycling and implement organic waste management options. The waste composition studies and reports about the components of the waste stream in Minnesota Schools have concluded there is an opportunity to expand and improve School recycling and organic waste management programs. However, an important remaining study – focused on understanding the costs and benefits associated with solid waste, recycling, and organics programs as well as the potential for net cost reduction for Minnesota K-12 Schools – had not been conducted. This report addresses this topic, providing information on programs and potential in Schools around the state, and highlights information from leading Districts and Schools. The MPCA hired Skumatz Economic Research Associates (SERA), with subcontractor JL Taitt & Associates, to conduct the work.

The report uses information gathered from several efforts:

- A statewide survey of K-12 recycling and organics diversion programs,
- Review of invoices and contracts obtained from dozens of Districts, and
- Detailed site visits and audits for a subset of Schools.

Based on 2013 data, almost 17%[1] of Minnesota's population spends the bulk of their days attending public (or private) School at a facility outside their home. Considering options for improving waste management at facilities with so many people for so many hours has the potential to increase diversion from the Schools sector, as well as potentially save Districts money. Based on the findings, the results of the study can also help Schools identify best practices in recycling and organics programs from other Schools, design more cost effective diversion programs, and improve their solid waste contracting.

1.1 Findings from the Statewide Survey and Review of Invoices

A web-based survey was developed to gather information on:

- School characteristics (grades, number of students, etc.)
- Non-curriculum activities that may affect waste generation (sports, cafeterias, etc.)
- Basics of recycling and organics program designs (containerization, materials, etc.),
- Perceptions of program use (recycling and organics)
- Decision-making for solid waste management and contracting / service arrangements
- School policies and staffing related to solid waste.

Costs were not gathered as part of this survey effort, although three months of invoices were requested, and responses were received from about a third of the respondents. Almost 150 survey responses were received from Districts and Schools across the State, including responses from about one-third of the

[1] Data shows 898,717 students, with 17,247 being home-Schooled. Source: 2013-2014 Minnesota Legislative Manual, Chapter 7 Local Government, pg. 442, http://www.sos.state.mn.us/2013_MN_legislative_manual/chapters/chapter_7-local_government.pdf. Percentage of 16.6% calculated using Minnesota state population of 5,420,380 from US Census QuickFacts, http://quickfacts.census.gov/qfd/states/27000.html

Districts around the State in 56 of 87 counties. The presentation of results summarizes two groups – those from Districts that responded, and those from individual Schools that responded (a smaller sample of about 35).

The response rates and the responses themselves made it clear that the School Districts make many of the decisions regarding solid waste management at the School level (and they pay the bills as well). Respondents covered rural, suburban, urban, and mixed Districts. While not true in all locations (private Schools and some individual Schools sometimes contract for their own services) the majority of the program and policy-level recommendations are probably most applicable at the District level, at least for public Schools. While that may make it easier for the State to provide direct assistance -- 300 entities allows a more concentrated outreach / assistance effort than 3,000 individual Schools -- it will be important to help Districts recognize differences and develop appropriate programs within their District.

Findings on Solid Waste Practices

The survey found the following.

- Almost all Schools (93%) of the School Districts had recycling programs at all or most of their Schools and 97% of the individual Schools did as well. Minnesota State Statute §115A.151 requires recycling at Schools in the State.
- Food service is common at Schools (more than 85% of respondents), but organics recycling programs are in place in only a quarter (23%) of Districts and 56% of Schools. The vast majority of the organics programs are in place in those Metro-area counties that have an extra solid waste tax in place (a substantial incremental tax beyond the Statewide trash tax), and the decisions to incorporate the program into the contract was made at the District level.
- Teachers, staff, parents and others are portrayed as supporting recycling in 75-90% of the cases, but nearly two-thirds of Schools and Districts state they are supportive of recycling only if the programs are cost neutral or save money, and 53% do not know if recycling saves the School or District money.
- Nearly all respondents recycle paper and cardboard (91%) and about three-quarters recycle aluminum and plastic bottles. More than 60% recycle glass bottles.
- For the most part, the Districts make solid waste decisions (96%). Schools have little control and often wouldn't see the savings (62%), potentially mitigating incentives for strong participation and local champions. The majority of respondents stated that if a School wanted to adjust or start-up service, they must go through the School District first.

Findings on Contracts, Service Levels, and Invoices / Bills

- Decision-makers at Schools and Districts are generally unfamiliar with a number of the contract and invoice details that affect their rates. Half of Districts (52%) and 11% of Schools actually said they have a copy of their contract. A quarter of the School District respondents that reported being in charge of paying and contracting services, replied they did not know if recycling has any effect on the cost of solid waste services.
- There is a general lack of awareness of current recycling options or service levels, representing a potential barrier to improvements. A total of 44% of responding Districts said haulers have not offered to analyze service levels and 36% said no one monitors service levels or container fullness at Schools.

- Review of the invoices finds that service level coding is far from clear, and it is not surprising that Districts or Schools are unsure about service levels. This makes "price- shopping" complicated, although it is certain Schools could not lose from going out to bid, as they can either keep their current service or select a bidder with a lower cost (and potentially ask for a refined bid from their current hauler).
- Haulers were called to ask questions about invoices and to get quotes about costs if Schools increased their recycling for the on-site visit Schools. The haulers reported that they price differently (lower) for Schools than they do for other non-residential establishments (traditional businesses).

Findings on Costs, Savings, and Diversion

The invoice analysis provided four main findings:

- Recycling rates in Schools with recycling only are quite a bit higher than in Schools with both organics and recycling. While overall diversion (recycling and organics) is perhaps three percentage points higher for Schools that have organics, recycling programs in these Schools achieve only about 60% of the capture as the Schools with recycling only. This is a considerable underachievement, and Schools in some areas could reap savings from boosting performance from the existing recycling programs.
- Increasing diversion is not the same as saving money for Schools – at least in the no-County-tax areas. This report, and others, provides information on how to reduce trash and increase diversion (recycling and organics) in Schools. However, the economics can be quite different in the counties influenced by an additional solid waste tax compared to those without.
- Communities with additional local solid waste taxes achieve savings because recyclables and organics are exempted from the taxes. The extra solid waste tax in place in a number of Metro-area counties has been very influential in changing the relative economics of trash vs. diversion. Figure 1.1 summarizes these results. In the areas without extra County taxes (State-only taxes), trash is substantially cheaper per cubic yard than organics ($6 vs. $12.50 per cubic yard) and about the same as recycling ($6-7). In the Counties with the additional tax, on the other hand, trash costs are considerably more expensive than the alternatives ($23 per cubic yard vs. $7-9 for diverted streams), leading to an economic incentive to divert through both recycling and composting services.
- The costs of trash and recycling in the no-County-tax areas are about a wash; the dollars are not significantly different (as indicated by the overlap of the ranges). Recycling thus makes economic sense, on average, all around the State, even in the no-County-tax areas around the state.[2]

These results (included in Figure 1.1) about the relative cost of recycling and organics diversion – and the potential for savings in hauler costs – come from a statistical analysis of more than 500 invoices for Schools and Districts with trash only, trash and recycling, or trash / recycling / organics service. The analysis was used to estimate the share of total invoices (or hauler bills) that are attributable to the "stopping or collection" charge, separately from the cost per cubic yard or material collected. This enhanced analysis avoids the problems that arise in simple comparisons of total costs per cubic yard; the stopping charge spread across a small number of cubic yards (for example, from small districts or for

[2] Of course, individual areas may vary, or specific quotes from haulers may not align with this overall finding, but the results are encouraging for recycling economics.

those not recycling / composting a great deal) can confound the results of the cubic-yard charges and lead to results that are difficult to explain in an overall sense. The results in Figure 1.1 show that the stopping charge for trash is higher than for other services, indicating that, perhaps, once a hauler is selected for one service, they may make deals for additional services, or the costs for billing and customer services are all included in the trash service element. In addition, the results show that in the Counties without additional taxes, trash and recycling are similar in cost ("a wash", with overlapping ranges), but organics collection per cubic yard is substantially more expensive. In the Counties with the additional trash tax, trash is more expensive per cubic yard than other services. Savings occur in the extra-tax areas; recycling may tend to be "a wash" in other areas, and organics is currently a difficult case to make outside the Metro extra-tax area. The figures indicate that increasing diversion can decrease costs in the extra-tax areas (even including the collection component), but the case is harder to make in other counties. In these counties, it may be that the motivation for the organics programs that exist may be in green ethic[3] or local conditions.

Figure 1.1 Invoice Cost Analysis for Three Streams, Decomposed for Collection Cost[4]

	Collection Component (per collection per month)	Cost per cubic yard collected per month ($)
Trash - in Counties with additional Solid Waste Tax	$23 ($12-34)	$19 ($17-21)
Trash – in No-County-Tax Areas (includes state tax)	$23 ($12-34)	$6 ($0-13)
Recycling	$9 ($5-15)	$7 ($6-8)
Organics	$7 ($0-$14)	$12.50 ($11-14)

(parentheses are confidence ranges)

1.2 Findings from School Site Assessments

The SERA/JL Taitt Team used the database of online survey respondents to identify a representative sample of 21 Schools—comprised of eight (8) elementary, six (6) middle and seven (7) high Schools—located in 15 independent School Districts within 11 Minnesota counties. The School site assessments occurred between March 25, 2014 and May 1, 2014. School District personnel participating in the assessments routinely included a director or supervisor of facilities, buildings and grounds or plant operations and the head custodian. At some Schools, principals and teachers also participated in the assessment. These on-site visits were designed to observe and evaluate District leadership and top-down support; trash, recycling and organics collection container infrastructure; education / awareness and student participation; School needs (e.g., containerization, labels and signs, adult supervision of students); and importantly, building barriers (e.g., storage space, loading dock / service access). The site assessments included:

[3] A recent study by Skumatz Economic Research Associates related to Commercial Recycling showed that the drivers for communities to intervene in the commercial sector was not local economics or nearness to port or markets, but "green" staff and council. See "2013 Roadmap to Commercial Waste Reduction", prepared for Urban Sustainability Director's Network, January 2014.

[4] Note that there was some increase in per cubic yard costs for recycling and organics in the tax areas; prices were quoted higher in that area than in the more rural areas.

- A walk-through of the sites and discussion with staff,
- Suggestions / ideas for improvements in current practice (including signage, containerization, modifications to services, etc.)
- Follow-up analysis of potential changes in services and the effects on diversion and cost for the Districts / Schools.

Based on the analysis of the on-site work, the visited Schools were classified into low, medium, or high performance.

Recycling Program Costs:
The analysis of the School site assessments showed that an increase in recycling would lead to cost savings. It is estimated that nine out of ten Schools would decrease monthly service costs if their diversion rates were increased due to an increase in recycling volumes, ranging from $25 a month for a Stearns County elementary School to $597 a month for a Ramsey County middle School. It is estimated that one School would increase its costs by $64 a month if it recycled more. If all discarded materials were managed as trash, nine of the ten Schools would see cost increases from $116 to $1,132 per month.[5]

Pre- and Post-Organics Program Costs:
For three Schools that launched compost programs, actual pre- and post-program cost data were available. All three Schools experienced increased costs after the launch of organics programs, ranging from $18 to $474 a month. For two Schools, monthly hauler service costs decreased after the launch of compost programs, but the added cost of purchasing compostable bags increased total overall costs.

District Leadership, Top-Down Support, Adult Direction & Supervision of Student Participation:
Strong District leadership and top-down support results in Schools with high performance recycling and organics programs. When District leadership trickles down to School principals, faculty, and staff, students receive the consistent adult direction and supervision they need to be successful participants in recycling and organics diversion programs. With top-down leadership, teachers and staff are able to create a "School culture" of recycling/organics education, awareness and student service-learning roles and responsibilities supported by consistent adult direction, supervision, and expectations. Without top-down leadership, Schools with highly committed teachers and staff providing students direction and supervision are at risk due to staff turnover and attrition.

District Waste Reduction & Recycling Policy:
Nine of the 15 School Districts that were visited have a District waste reduction and recycling policy approved by their School board. While the policies vary from District to District, District-level policies were in place in the two high performance Schools and two-thirds of the medium and low performance Schools are in Districts that have waste reduction and recycling policies.

Collection Container Infrastructure:
Collection container infrastructure is fundamental to successful recycling and organics diversion programs in Schools. The study classified the internal collection containers into three generations, from cardboard boxes and "borrowed" city curbside recycling bins, to more sophisticated container collection systems. Best practices and tips are provided.

[5] One School would be saving money by ceasing their recycling options. They might want to consider re-bidding their service collection.

Diversion Rates:
For the 21 Schools evaluated on site, the diversion rates are in the range of 17-53%, with most clustered around 35%. About half the Schools visited had implemented an organics program (52%). Adding organics diversion of this wet, dense material, led to substantial increases in the diversion performance, increasing some diversion rates to the 71-75% range. Some of the Schools implemented a food-to-hogs organics management program (5 Schools) and others implemented a compost program (6). Drivers for successful organics diversion programs include consistent adult direction, supervision and expectations of students in the cafeteria and program logistics that support efficient operations for staff on a daily basis. The heavy weight of this waste stream led to some operational complexities – including problems from lack of wheeled dollies on collection containers, limitations on how full compostable bags and collection containers could be (to avoid breakage or excessive weight), and contamination issues.

Contracts:
A significant barrier for Schools in managing their waste management costs is the lack of price controls surrounding the prices they pay for waste, recycling and organics services. Of the 21 Schools that were evaluated on site, six Schools have contracts, 13 Schools do not have contracts and two Schools did not provide contract information. Of the six Schools with contracts, two are standard hauler contracts with pricing terms and conditions that favor the hauler and not the Schools. As noted above, this is an area with significant room for improvements for Schools and Districts.

Resulting recommendations are provided below.

1.3 Summary of Recommendations

The analysis of the statewide School surveys and basic invoice / contracts review resulted in a number of recommendations. Note however, that enhancing savings for Schools or Districts is not as simple as increasing diversion. Savings seem to result from almost all increases in recycling, regardless of area of the State. On the organics side, however, whether a School or District saves money depends on 1) whether they are in a County with an extra Trash Tax beyond the State's assessment; 2) whether they can divert enough material to make up for the additional collection / stopping fee, and 3) whether the bag liner costs for organics are more than any estimated hauler cost savings. Recommendations are provided in four sections:

- invoicing /contracting improvements to save money;
- recycling improvements to save money;
- organics strategies which may save money (depending on School or District location); and
- other strategies.

Recommendations to Save Schools / Districts money by Improving Contracting, Invoicing, and Service Arrangements with Haulers

Districts and schools should re-bid their existing solid waste contracts, rebidding for trash and recycling, or trash / recycling / organics service, and should do so on a regular (every 3-5 years) basis. This will lead to cost savings from right-sizing, combined service economies, and the competitive marketplace. Part of the analysis should include a request for favorable terms (limiting or requiring approval for new /

changed fees, modest or no cost increases, easy or clear contract end terms, etc.)[6]*. In addition, the District or school should require clear statement of service levels on the bill, and consider requesting an updated "right-sizing"*[7] *visit to the school midway through the new contract's term. Finally, Districts have been pro-active at requesting combined bids and services, and Districts may be in a position to achieve a great deal of progress quickly. More detail follows.*

- **Official RFPs for solid waste services should be issued by each District on a regular, frequent basis.** Only 50% of the responding School Districts reported going out for bid for trash and recycling services on a regular basis. Twenty five percent of responding Districts said they do not go out for bids at all. Official RFPs for solid waste services should be issued by each District on a regular and frequent basis (perhaps every 3-5 years). This will allow each District to get the most competitive prices and better service options by providing competition among haulers and will force them to evaluate and right size all of their services which can also result in savings and better service. Since currently most haulers aren't offering to evaluate the solid waste services, more frequent RFPs will accomplish this.

- **Districts and Schools should request separate invoices for each School location with details of service.** Each invoice should include the following items in one line for each separate material: the dates of service, the container sizes (individually listed if more than one size) contracted for collection, the contracted numbers of each container, the contracted frequency of collection for each container, the price per collection, and the total price of the collection for the container(s). Knowing the cost of services through clearly labeled invoices not only allows for comparative bids, but also allows individual Schools to be motivated by seeing the increase in the amount of materials diverted or any cost savings.

- **Rightsizing trash, recycling, and organics for correct service levels could improve cost efficiency.** Making sure that waste containers are full before each pickup will help ensure Schools are not paying for unnecessary service, and the survey showed evidence that trash containers may currently be oversized in some Schools. If recycling bins are overflowing, a School may be able to increase their size or frequency of recycling and cut back on trash service. From the District respondent perspective, a little over half (57%) believe someone is monitoring the bins for correct service levels. A minority has received an offer of right-sizing service from their haulers, and only a minority of Schools has conducted an assessment of services in the last three years (one-third). In areas with the extra solid waste tax, the cost savings are evident; in areas without a County-level trash tax, the figures indicate recycling is likely still cost-effective or very near so.

- **MPCA can help schools achieve more effective contracts**: MPCA may consider developing sample language and templates to assist School Districts in developing waste management

[6] For more detail on preferred contract terms, see report prepared by SERA / Taitt report "Solid Waste Management Coordinating Board: Commercial Cost and Billing Research", April 2013, (authors Freeman, et. al.)

[7] Reducing costs by reducing subscriptions to the right mix for the School; costs should be reduced the more trash can be reduced and the more put in recycling containers. In addition, reducing collection frequency and number of containers will generally lead to savings if space allows. As mentioned, whether the addition of organics will save money depends on the presence of an additional County trash tax, the cost of purchasing liner bags, and other local School / suitability considerations.

service contracts with terms and conditions that include cost controls, rate structures with diversion incentives and mandatory right-sizing of trash, recycling and organics services.

- **Decision-making at the District level has benefits and costs; Districts may need to craft some incentives to maximize recycling in individual Schools**. The Districts appear to be the drivers in the incorporation of organics programs into the trash (and recycling) contracts and bids. That means once decision affects many Schools, and in fact, this has led to more organics than might have happened without Districts-level decision-making; outreach and education about options should be facilitated when only 300 entities are involved, rather than 3000 individual Schools. Rightsizing can be one District decision, circulating throughout Schools within a District on a periodic basis, for instance. Regular bidding can be implemented as a policy, affecting many Schools at once. However, with payments and decision-making out of the Districts, the Schools do not reap direct benefits from any savings that may accrue from additional recycling or diversion. Introducing contests, "shared savings" arrangements, or other options may help energize School recycling and organics programs, and improve program performance, and savings.

Recommendations for Reducing Bills and Trash by Improving Recycling Diversion and Effectiveness

Diverting more recyclables appears to be a "win" (resulting in cost savings) for nearly all Schools and Districts around the State, so implementing strategies to increase recycling through enhanced programs capturing more materials, and "getting more" from existing programs through better containerization and signage, education, and model program elements will lead to savings. Strategies to reduce costs also relate to the basic principles of cost saving: reducing collection frequency and container size (rightsizing, as mentioned above). Communities with additional local solid waste taxes achieve savings because recyclables and organics are exempted from the taxes. More details follow.

- **Supervision and leading by example help improve success of recycling and diversion**: Schools should provide students with consistent adult direction, supervision and expectations of students participating in recycling and organics diversion programs to improve the performance of the programs and to drive home the education / awareness / behavior message. Schools – and the adults in charge – can lead by example, by having the adults participating in recycling and organics diversion programs and providing a model for student behavior.

- **In some cases, looking for opportunities for separate collection of special recycling streams may save money**. Some Schools or Districts have their trash haulers collect some materials, but have contracted with others to collect some specialized recyclables (presumably "clean stream" to gather higher market values). This may make sense and save money in some areas with high volumes; however this has to be balanced against the "deal-making" and negotiations that seem to be part of the system of getting bids for service collection contracts. Those Schools having trash collected by one hauler and recycling by another may want to see if they can achieve savings from combining service; some of the invoice analysis indicated this may save money in many cases.

- In-school recycling programs can benefit from review of "best practices" in the design of the recycling program from other schools. Suggestions follow.

- **Schools are missing some recyclables streams that could lead to savings**. Not all Schools recycle beverage containers, glass or plastics, milk cartons, or packaging. Single-stream programs usually take these materials, and haulers could be asked if the materials can be added. Diverting more material to these (usually-eligible) streams into the School's recycling bin should save money or be nearly a "wash", cost-wise.
- **Enhanced recycling awareness at the School level can increase diversion, and save money.** Only 5% of the responding Schools reported having recycling contests and none reported any recycling award program. About 70% said they don't use recycling for any fundraising. Contests and other social marketing options may help increase participation and cost-effectiveness of programs.
- **Districts – and schools – should use best practices in containerization practices and labeling to get higher diversion and save money**: Upgrade collection container infrastructure District-wide to best practices methods comprised of color-coded trash, recycling and organics containers with lids and labels consistently placed in classrooms, offices, hallways and cafeterias that visually demonstrate the type of material that can be collected. Clear and consistent signage – and parallel placement (no trash containers without recycling / organics that are "just as convenient") is important.
- **Better access to recycling containers can be help improve recycling and cost-effectiveness**. Although containers are in place in some key locations (kitchens, cafeterias), their access at sport events, weekend activities, halls, offices, and other locations are less common. Further, there was a perception that diversion containers (recycling and organics) were less prevalent than trash cans. Given that parallel convenience is key to successful recycling programs, improved access could decrease trash and increase recycling (and organics), and in areas with these programs in place, cost savings should occur. More than 40% of individual School respondents said there are no (or limited) recycling symbols, pictures, or examples of materials on recycling containers. Pictures are the direction that most signage is taking these days with "no" signs (red circle with a slash through non-accepted items. This approach is purported to be faster for users to read and understand, and addresses language issues. Increasing recycling is likely to be a wash or a savings across most of the State; increases in organics may or may not save money, depending on the location of the School.
- **Avoiding disposables in the cafeteria may save money**. Some Schools used single-use cutlery (25%), and disposable trays (8%); some encourage their students to stack the trays to reduce trash volume. Changing the delivery of service to reusables would reduce trash and solid waste bills in jurisdictions, but would have implications for staffing, ware-washing, and up-front costs. The costs and benefit would need to be reviewed at a School or District level.[8]

Recommendations for Diverting Organics – which can result in Cost Savings for Some Districts / Schools

Diverting organics reduces trash volumes, but may or may not result in bill savings at the School or District level, largely dependent on whether the County in which the School is located has an extra tax on solid waste, beyond the state trash tax. Note that organics programs are not currently available in many

[8] A recent MPCA Study found that schools with dishwashing facilities can achieve substantial savings by switching to reusable dishes and silverware. Details from the study can be found here: http://www.pca.state.mn.us/a3akyrq

parts of the state. The State currently has only 9 or 10 facilities permitted to accept SSO in the state. In places in which the programs make sense, savings can be improved if MPCA or other agencies can help reduce the cost of bags though a statewide procurement initiative. Many schools have outside-classroom activities that generate food waste, and organics can be a substantial portion of the divertible waste stream in these schools. Achieving maximum diversion may benefit from supervision at the point of generation; contaminated streams are a problem in organics programs.

- **There is potential for large gains in diversion by implementing organics programs, and potential savings exist in Counties with the extra Solid Waste Tax**. Since so many Schools have kitchens, athletic fields, theaters, before- and after- School activities, and other community events, there are strong opportunities to reduce their trash tonnages by diverting organic materials and potentially reduce costs by reducing trash service and avoiding additional taxes on trash services. Food waste diversion is a double-digit item that could reduce Schools' trash volumes by 16% or so, based on the results of Schools with programs in place. However, the economics depends on the location of the School. In areas with the extra County trash tax, the savings should result; in other areas, the Schools will need to make sure there is a facility, and consult with their hauler to explore the relative economics. Adding a waste reduction component (reducing overall solid waste generation) may be one way to improve the economics in these areas. Note that the invoice analysis also indicated additional savings may result if the trash hauler is consulted about combined services (to achieve savings in the collection component).

- **If a compost program is implemented, attention should be paid to making sure the recycling program continues to perform strongly after the introduction of the organics initiative**. There was evidence of weaker recycling in Schools with organics programs (capturing about 60% as much recycling as in Schools without organics programs). This can probably be avoided with management attention, and will improve the economics of the overall solid waste system.

- **MPCA may be able to help improve the economics of organics**: MPCA or other statewide organizations may be able to consider large procurement contracts to help Schools procure compostable bags at a lower per unit price.

- **MPCA may be able to help identify best "field" practices in organics to help spread the word on how to work out kinks that delay roll-out of organics**: MPCA could work with Schools to develop organics diversion program logistics that support efficient operations for staff on a daily basis such as managing heavy, wet food waste.

- **Districts may increase organics (and recycling) diversion by improving oversight of separation at the generation point**: Identify strategies to dedicate staff to consistently monitor and supervise students separating materials in cafeteria sort lines.

Other Recommendations to Help Increase Diversion and Savings

A few other recommendations are provided that leverage input from MPCA, or set a tone for recycling from the "top" at Districts or Schools.

- **Move recycling up in priority by establishing recycling standards on a par with other standards**: MPCA could work with the Minnesota Department of Education to create an inherent reason for Schools to educate students on how to recycle and divert organics by establishing academic standards for waste reduction, recycling and organic waste management. Link these academic standards to graduation requirements in writing, reading and mathematics and include them in state tests that help Districts measure student progress such as the Minnesota Comprehensive Assessments (MCAs).

- **MPCA could help remove funding barriers**: MPCA could establish grants or revolving funds to assist Schools with the funding needed to implement best practices collection container infrastructure.

- **Leadership at the top matters:**
    - **Districts should establish and/or update District waste reduction and recycling policies**. Districts have been leaders in moving into organics and integrated service contracts. Use new or updated District waste reduction and recycling policies to obtain top-down administrative leadership and support for recycling and organics diversion programs.
    - **Schools with strong culture for recycling achieve higher levels**: Where possible, schools should provide top-down leadership where principals, teachers and staff are able to create a "School culture" of recycling/organics education, awareness and student service-learning roles and responsibilities.

SECTION 2: SUMMARY OF SURVEY, BEST PRACTICES, AND INVOICE ANALYSIS

2.1 Introduction and Data Collection

Previous work by MPCA has shown a need – and a potential – to save money and recycle more in the K-12 School sector. However, additional work was needed to identify the potential and analyze the financial impacts of additional diversion, existing and best programs, and improved contracting practices. To assemble the information needed for this analysis, SERA worked with MPCA to construct a survey that would gather information from statewide Schools and School Districts on:

- School waste, recycling, and organics programs, including program design and collection systems;
- Use and performance of the programs
- Program decision-making, management, and staffing, and awareness of cost- and contract-related issues / conditions; and
- School characteristics for the respondents, including grads, size, and other information.

As a follow-on to the survey, we also asked for copies of solid waste invoices and contracts, which we received from a portion of the respondents. We also assembled key "best practices" that Schools in various situations could use to transfer more waste to the recycling or organics stream.

After multiple rounds of outreach, we received responses from about 35% of the School Districts across the state (117 of 333), and a very small number of individual Schools (37 out of more than 3,000 total in the State). However, the combined responses from Schools and Districts provided us with information representing more than 1,200 Schools in the State, or about 38%. The responses were spread around the state; responses were obtained from almost two-thirds of counties in Minnesota. Responses were received from rural, suburban, and urban areas of the State.

Responses from Districts were mostly from building and grounds staff, and superintendents and supervisors. School respondents were mostly head custodians, principals, supervisors or engineers. The School sizes ranged from 100 or less to more than 4500 students, with the most common School size of 400-600 students (about one-third of respondents). All grades were fairly evenly represented, with grades PS-5 a little more frequent than high School responses.

While decision-making questions were included in the question modules for both Schools and Districts (Districts turned out to be more relevant), most of the questions about performance and practices in Schools were directed toward Schools respondents (small number of respondents), who were expected to have more direct contact with the actual containers and use, etc. More detailed information on the outreach and responses is provided in Appendix A; the survey document is included as Appendix B.

2.2 Programs, Decision-Making, and Costs for Diversion

Non-Classroom Activities and Facilities at the Schools

Solid waste generation at Schools comes from far more than just the traditional classroom environment. The vast majority have non-classroom elements with diverse implications for generating – and diverting -- solid waste. Almost 90% regularly have community events during non-School hours; 70% have before- or after-School athletic events; more than half have other types of before- or after- School activities, with 44% reporting these events have meals, and 59% have these events without meals. Schools have a wide variety of special facilities as well.

- More than half of reporting Schools or Districts have: community gyms (69%), athletic fields (64%), School age care (58%), or community education facilities (56%).
- More than one-quarter (less than one-half) have: pre-School (44%), theater / auditorium (42%), home economics and kitchens (39%), shop / woodworking / metal (36%), and early childhood or family education facilities (33%).
- Less than a quarter of respondents have: sports stadium (22%), swimming pool (22%).

Food service, which brings opportunities for composting, is fairly common at Schools. Only three percent have no kitchen-type facilities, 14% say they have limited service kitchens ("heating up"), and more than 80% stated they have full service kitchens (69% have institutional dishwashing machines). A little fewer than half have garbage disposals (44%). About 11% prepare meals for other Schools.

Many use single-serve drink containers (78%), and a quarter say their cutlery is single-use (25%) or use single use Styrofoam / disposable trays (8%). Vending machines are in place in 31% of the respondent facilities.

- ð *Note / implication for Increasing diversion: There is potential for greater diversion in the form of more ware-washing (dish / cutlery washing rather than disposables) and making sure there are convenient containers available near the use of the single-serve drink containers (with a focus on using recyclable containers). This should be possible given nearly all Schools had recycling programs. More than 40% of the (small sample of responding) Schools say they ask students to stack disposable trays to save trash space, and this strategy can help, but reusables can save 100% of the space. Certainly, the ware-washing and reusables changes have costs in terms of staffing and equipment, and the School would need to assess the benefits and costs.* [9]

Recycling Practices

Virtually all Districts had a recycling program in place at all or almost all Schools in the District (97%). More than half said they had an organics program (56%).

When individual Schools were asked about the use of the programs, about 90% said the recycling programs are well-used (84-94% depending on the specific question), but 44% say there are still "lots of" recyclables in the trash. Some Schools reported overflowing recycling container inside and outside the School (less than one-quarter). Nearly two-thirds of the responding Schools say students help

custodians with the recycling duties, and more than a quarter of the Districts (29%) have an employee who deals with sustainability and environmental initiatives. When asked where recycling containers were placed, Schools and Districts reported:

- Commonly placed in kitchens and cafeteria
- Less commonly in off-hours activities, bathrooms, classrooms, teacher lounges, and offices.
- Rarely are they placed at sports events, weekend activities, halls, and outside / on grounds

ð *Note / implication for increasing diversion: Since convenience is a key to successful recycling programs, there is clearly an opportunity to increase recycling if containers are placed in association with more of the range of recycling- and organics-generating activities taking place at and with Schools. Staffing and containers may be the difficulty, but in many areas, bills could be reduced if more material was diverted.*

Schools have instituted a number of diversion activities. Many have a staff person responsible for sustainability initiatives (57%) or green teams or environmental clubs (48%), and have an assembly or green training for students (57%). Fewer report specific class curricula covering recycling (38%). Almost none run recycling contests or have awards programs.

ð *Note / implication for increasing diversion: Contests and award programs and other social marketing options have been successful in energizing lagging recycling in some areas, and could prove useful. More universal clubs and classes can help raise the environmental and recycling ethic, helping increase diversion.*

Single stream recycling (where all the recyclables are put in one container together, but separate from the trash or organics waste containers) is the norm in more than half the School respondents (59%); another 35% say their recyclables are separated into two streams, or more than two streams. Districts were not asked this question.

ð *Note / implication for Increasing diversion: Separated recyclables can help maintain somewhat higher prices for material, but the literature notes that single stream recycling significantly increases convenience and volumes recycled, and saves space – inside and outside the facility.*

Combined trash and recycling collection by one hauler is not the only collection arrangement. Nearly three-quarter of Schools collected trash and recycling with one hauler, but other arrangements were in place:

- 56% have only their trash hauler collect recyclables, but 44% add collection of some recyclables by another firm
- 29% have all their recyclables collected by a affirm other than their trash hauler.
- A few bring recyclables to a drop-off.

ð *Note / implication for increasing diversion: Schools may benefit by having more than one hauler bid on service contracts. If certain high-value materials can feasibly be kept separate (cardboard, paper), then they may see advantages for separate collection. If space, staffing, or other constraints make that difficult, the invoice analysis below seems to indicate that combined trash and recycling hauling by one hauler may lead to "deals". An RFP process, conducted periodically, can identify savings for the Schools, because haulers will have to compete at that point in time. Haulers seem to count on inertia, and assume they will be able to keep the same*

customers even if costs aren't the "best deal" as long as there isn't a collection problem; they are usually right. Schools and Districts should seriously consider periodic bidding.

Recycling containers are most commonly paid for by the School District (50%) or the hauler (30%). Other sources are state / community/ other grants (24%), or the Schools (11%).
Schools have implemented programs that collect a wide variety of materials, but the most universally recycled include:

- Cardboard, office paper, and other paper (about 90%)
- Beverage cans (about 70-75%) and plastic bottles (77%)
- Glass (65%)
- Milk cartons (59%)
- Food prep / food waste and compostable paper (43-54%)
- Scrap metal (46%)
- And hazardous and electronics materials (54-57%).

Schools are less likely to recycle:

- Plastic cups (40%)
- Other glass (37%)
- Packaging (20%)
- Yard waste (14%)
- Wood pallets, etc (29%) and
- Grease (23%)

ð *Note / implication for Increasing diversion: Paper, which tends to have a reasonable market value, is included in most Schools programs (whether a high percent of the material is actually recycled could be determined from a simple waste sort). However, there appears to be additional opportunities from several key materials: adding beverage container recycling (cans, plastic, milk cartons, etc.) to that one-quarter to one-third of Schools lacking access should help divert materials generated from lunches, etc., and packaging waste can be a significant waste stream in Schools. Fryer grease and yard waste may also represent additional opportunities for diversion for a significant number of Schools. The percent diverting food-related organics is roughly in line with those that have programs in place; this stream is clearly one of the largest-volume (and weight) items remaining for Schools, and if the economics can work, can increase diversion by double-digits. The almost one-half of Schools that do not report diverting e-waste and hazardous waste regularly is worrisome.*

Organics Practices

As noted above, virtually all Districts had a recycling program in place at all or almost all Schools in the District (97%). More than half said they had an organics program (56%). The organics programs reported in the survey are all in place in Schools / Districts in four counties:

- Hennepin
- Anoka
- Ramsey
- Scott.

Counties charging the extra solid waste tax include: Ramsay, Hennepin, Anoka, Stearns, Winona, St. Louis, Washington, and Nobles.

On the organics side, nearly 80% of the Schools or Districts with programs have a private company collect the material and bring it to a compost facility; farm or livestock feed is the second-most-common destination (16%), followed by on-site in-vessel composting or vermicomposting (5%). Nearly three-quarters use compostable bag liners; 16% say they do not.

Schools with organics programs say they commonly have organics containers at the following events / locations:

- Commonly placed in cafeterias and kitchen;
- Fairly commonly placed in teacher lounges, bathrooms, and classrooms
- Less commonly-placed in before/after School events, weekend community events, hallways, in offices, and outside School grounds. They are virtually never placed at sporting events.

ð *Note / implication for increasing diversion: Lack of containers at additional events may hamper more complete capture of organics, but if not accompanied by extensive education, the effort may be wasted if materials have a high chance of being contaminated, and thus, end up as trash anyway. Areas with highest opportunity for trained users and consistent use include cafeterias and kitchens, where they are commonly placed now.*

Presence and Labeling of Containers

Overall, the School respondents are left with the impression that (interior-building) diversion containers are less common than trash receptacles. More than half say there are more trash than diversion, about a third indicate they are about equal. Nearly half think they do not have enough diversion containers in the Schools. When in place, signage for containers usually includes words (59%), pictures (56%), or both. A third have examples of recyclable materials (38%), and more than half (59%) include a recycling symbol. However, 6% say there are no labels or signs.

ð *Note / implication for increasing diversion: Parallel convenience is a core concept for recycling and diversion programs. If the user has to look for the "other" container, only the most avid recyclers do so. Containers should come in pairs (trios), appropriately sized so one does not overflow and stop being used. Pictures are the direction that most signage is taking these days, with "no" signs (red circle with a slash) through non-accepted items. This seems to be faster for users to read and understand, and addresses language issues. Clear signage is very important to successful programs.*

Program Decision-making, Contracts and Invoicing Practices

Decisions about trash, recycling, and organics services and providers are most commonly made by the District (70-85%), and the contracting process also most commonly happens with the District, although some of the Schools respondents reporting having local contracts. Both District and School respondents said decisions were sometimes made by the local principal (about 10-20%). The bills follow the decisions: Districts most commonly pay invoices, according to Districts (96%), and the individual School respondents also report Districts are the bill-payers most commonly (57%). Twenty percent said Schools paid, and 23% didn't know who paid. About 52% of the Districts stated they had a contract; when

Schools were asked whether they had the solid waste contract, 60% said the Districts had them, and 11% said the Schools had the contract. About 20% stated they did not have contracts.

Whether services are monitored, or match to services paid, is another question. About 70% of Districts say they verify the bins service levels for Schools. Nearly half say the individual Schools do not monitor or verify service levels, and nearly half say the haulers have not offered to analyze School recycling / diversion needs ("right-sizing containers to divert more and/or save money). Another 5-15% did not know.

Schools respondents (on-site and able to see the containers, but a smaller respondent sample) were asked about how full their containers were when collected. Trash containers were least likely to be full (about one-third); they seem to be over-subscribed in many cases. Nearly half were only three-quarters full, and another 10-20% were half full. Recycling containers were most likely to be full, with more than half either full or overflowing at emptying time, and most of the rest were three-quarters full. For those with organics service, more than half were full or three-quarters full, with perhaps a quarter only half full. About 15% did not know the answer to these questions.

About one-third of Districts have conducted an in-depth analysis of their recycling and/or composting and garbage costs over the last three years; more than half say they have not, and 14% don't know. Only about 11% of individual Schools have conducted an in-depth analysis (54% have not, and 34% don't know).

- ð *Note / implication for increasing diversion: Districts are the focus for decision-making in the Schools sector. This provides opportunities for streamlined outreach on possible changes to recycling / diversion decision-making (333 Districts vs. more than 3,000 Schools). However, only about half the Districts seem to have copies of the contrast, full-ness is not routinely monitored on-site, and the full-ness of containers may possibly indicate subscriptions to the various services are not optimized. In particular, even Schools with recycling and diversion options may still be paying for too much trash service. There seem to be several areas of missed opportunities. Schools and Districts should look for contracts and review invoices to better be able to assure they are getting what they're paying for. They should conduct periodic verifications to identify if they may be over- or under-subscribing for service in one or more materials. Most importantly, they should call their hauler(s) to conduct a "right-sizing" analysis of their subscribed services – perhaps after they review the diversion options from this report. At that point they could have a discussion with the hauler to identify the potential diversion, but also the overall cost implications of those changes to service.*

Only about half the Districts regularly go out for bids for their solid waste service(s). One quarter say they occasionally issue bids, but one-quarter say they do not. Nearly three-quarters of the Districts (70%) say their contracts always include recycling jointly, and about one-sixth (17%) say they "sometimes" include recycling. Almost one-tenth (9%) say they rarely or never include recycling in the bid. Organics is the flip side. Nearly three quarters (70%) say they do not include organics in the bid (rarely or never), and 12% say they always do (6% said sometimes).

- ð *Note / implication for increasing diversion: Bidding is the most beneficial way for a School or District to obtain savings in trash, recycling, and organics services. It seems they can rarely be worse off; if they receive a better bid from someone else, they can go with that, or ask their*

current hauler for a "best and final" bid for continued service. This can be a complex full-rebid process, or potentially, if the School's invoice is clearly coded (states clearly the number, size, and frequency of collection of various services), the process could be as simple as "comparison shopping" for a better price for the same service. However, the best service may be achieved commingling with a "right-sizing" visit by the prospective haulers to make sure an over-subscription doesn't continue.

To obtain changes like adding containers or adjusting service levels, Districts contact their facilities / support staff two-thirds of the time, and the hauler one-third. Schools contact the District more than half the time (56-64%), the hauler 31-33% of the time, and 3- 9% don't know.

However, when asked whether individual Schools would see the savings if they decreased their trash levels, 62% of Districts said no, that the Districts pay and Districts reap the savings. In one quarter (23%) of the cases, Schools do save money (15% weren't sure).

- ð *Note / implication for increasing diversion: In many cases, access to programs seems to be determined at the District level; however, the aggressiveness of compliance and participation can be strongly influenced by local actions – at the individual School level. The current system does not reward Schools for decreased staff or increased diversion. If bill savings cannot be passed through, Districts (and Schools) may benefit from other incentives, including competitions, prizes, or "shared" savings approaches that have been successful in the energy efficiency field.*

Reported Savings from Diversion

There is strong support for recycling from students and teachers, and they believe there is strong support from Districts and parents (agree or strongly agree 75-90% of the time). However, only a third of Schools disagree with "supporting green" only if it is cost neutral or saves money (implying a third support it independent of costs). Many Schools are not entirely sure if they saved money through diversion (about half unsure); answers for whether it saved or cost individual Schools were spread across responses (some saved, some didn't).[10] School Districts who pay the bills most commonly, reported:

- Recycling programs decreased costs a great deal or somewhat (about 40%), or stayed about the same (25%). A small percent say it increased costs (less than 10%), and about 25% didn't know.
- For those with organics programs, organics programs decreased costs a great deal or somewhat (about 25%), stayed the same (about 10-15%), or increased costs (25%) tend to report individually, and about a third didn't know.
- For those with recycling and organics combined, about one-third saved money, about one quarter stayed about the same, and most of the rest weren't sure what happened to costs.

Workloads are also impacted by recycling and diversion, according to Schools and Districts. About a quarter of Districts have dedicated sustainability staff person(s). Less than 15% of both District and School respondents believed the workload for staff decreased with the implementation of diversion programs; 60% reported workloads stayed the same or increased somewhat (about half each). Schools

[10] About one-third of Schools say recycling saved, 12% say costs stayed the same, and a few said it cost; about 50% of Schools say organics saved, 11% say it stayed the same, quarter say it cost.

indicated the largest impacts were on custodial staff, and to a lesser degree, on teachers and food service staff.

- ð *Note / implication for increasing diversion: Cost savings do not seem to be a "given", although it is hard to get survey responses from those individuals who may know the most about all aspects covered by the survey. Recycling had a better chance of reducing costs than organics, but another section of this chapter conducts a cost analysis based on School solid waste invoices.*

Variations for Subgroups of Survey Respondents

For the most part, the responses were fairly similar across all respondents. However, some differences were noted for:

- School Districts that were in Counties with additional County-level solid waste taxes vs. not, and
- Larger vs. smaller School District
- Those with / without organics programs.

These differences are highlighted below.

Districts in extra County Solid Waste Tax vs. No-County-Tax areas: The Districts in the areas with extra County solid waste taxes (tending to be near the metro area) tended to be larger (5,000-40,000 student rather than the ranges up to 2,000 for the no-County-tax areas) and less commonly rural (23% vs. 60%). The "Extra Tax" area Districts were more likely to have a dedicated sustainability staff member (62% vs. 80%), were more likely to make solid waste decisions at the District level, and most importantly, and were twice as likely to have an organics program in place. Very few of the Districts in no-County-tax areas commonly include organics in the contract (80% do not), while 43% of the contracts in the extra tax areas included organics.

District Size: Most of the results were parallel to the preceding paragraph, with large Districts being similar to those in "extra tax" areas, and smaller ones not. However, smaller Districts were also less likely to verity bin sizes, and less likely to say the hauler has offered to analyze their services; larger Districts were more likely to have conducted an in-depth trash analysis.

Organics Program Implications: Those School Districts with organics programs are twice as likely to be located in counties that charge the extra County-level solid waste tax (65% vs. 25%), which may likely reflect the relative economic signals derived from the presence of a tax. Those Schools with organics programs are most likely to have had decisions made at the District level (100% for trash, 95% for recycling, and 95% for organics). In addition, these schools must be located in Districts with reasonably convenient access to composting sites; the state currently has only 9 or 10 facilities permitted to accept SSO. More than 60% of Schools with organics programs say they have conducted an in-depth analysis of solid waste services in the last three years.

- ð *Note / implication for increasing diversion: The extra County-level solid waste tax implemented in many counties in the Metro area, seems to coincide with far greater implementation of organics / food programs in the Schools and School Districts in those Counties. This has gone hand-in-hand with greater analysis (and right-sizing) of trash services. These counties have larger Schools, which make more material available, likely improving the cost-effectiveness of collection. To the degree that facilities are concentrated in the higher-demand areas of the state (more population), access may also be substantially more feasible in these areas. Jointly, these*

conditions – population, taxes and economics, facilities, and Districts making decisions that include organics – has led to a concentration of organics programs in Schools in the Metro area compared to elsewhere in the State.

2.3 Invoice Analysis

Invoices were obtained from a total of 47 Districts, and one School, located in 27 separate counties. The counties in which we had invoices are listed below.

Figure 2.1. Counties with Invoices Analyzed

County	Number of Invoices From County	County	Number of Invoices From County	County	Number of Invoices From County
Hennepin	6	Anoka	1	Murray	1
Mille Lacs	5	Carlton	1	Nicollet	1
Stearns	3	Crow Wing	1	Olmsted	1
Winona	3	Dakota	1	Pine	1
Cass	2	Freeborn	1	Ramsey	1
Nobles	2	Goodhue	1	St. Louis	1
Otter Tail	2	Isanti	1	Waseca	1
Rice	2	Kittson	1	Washington	1
Todd	2	LeSueur/Sibley	1		
Wright	2	Mower	1	Grand Total	47

We entered the data into a spreadsheet to facilitate analysis, but the task was challenging, because codes and identification of service levels were far from apparent, clear, or consistent in the invoices (See Appendix G for examples). The analysis supported calculations of:

- Recycling percentages, based on amounts of service, and
- Calculations of costs and savings for various programs and subgroups of Schools and Districts.

ð *Note / implication for increasing diversion: Invoice labeling is unclear, and possibly intentionally ambiguous (by haulers) to prevent "comparison shopping" or inhibit getting bids easily. We were able to compare many invoices, and in some cases that meant, which allowed us to analyze tradeoffs and savings. Schools or Districts with only one bill to compare won't have this advantage. Schools and particularly Districts should require the haulers to provide clear service codes on their bills. MPCA may want to include this suggestion in outreach literature as well.*

2.3.1 Diversion Percentage Computations

Figure 2.2 provides a computation of the percent diversion at schools with recycling and organics service. We provide the comparisons computed two ways – by volume subscribed (according to invoices), and by tons associated with the volumes subscribed. The invoices provided subscribed service

levels, by container size and collection frequency, allowing us to compute the cubic yards of various services that were being paid for by the various Districts and Schools. The calculations for tonnage were based on simple values of pounds per cubic yard from SWANA and other sources by aggregate material type.[11]

Figure 2.2 Recycling and Diversion Percentage Computations from Invoices

	Recycling Percent (using cubic yards / using tons)	Organics Percent	Diversion (Combined) Percent
Schools with only recycling (based on cubic yards / based on tons)	26% / 29%		26% / 29%
Schools with organics programs	16% / 16%	12% / 16%	29% / 32%

Schools with recycling-only programs recycle more than a quarter of their solid waste; those with organics programs divert 16% of the material through this program. Those with both programs divert a total of about 30%.

- ð *Note / implication for increasing diversion: The total recycling potential does not seem to be achieved in Schools with organics programs in place. The Schools are underachieving in diversion, and are also likely paying too much, because the results below indicate that the cost of recycling is cheaper than trash and cheaper than organics in areas in which we tend to find organics programs (those counties with extra County solid waste taxes). The Schools and Districts should place additional attention on the recycling efforts, and probably review the differences in programs between the high and low-performing Schools (see Chapter 3 of this report).*

2.3.2 Cost Analyses

Two types of analyses were conducted – a simplistic "average cost per cubic yard analysis", followed by a statistical analysis that separates the collection from the cubic-yard component. To conduct the analysis, each invoice was analyzed in terms of the information provided. Some included only dollar figures, and others included indecipherable codes. Where possible, we tried to translate codes for one hauler serving multiple Districts to provide more usable data. After translation and analysis, we entered those invoices that included trash (T), trash and recycling (TR), or trash, recycling, and organics (TRO) services but also provided sufficient information on cubic yards, numbers of containers, and frequency of collection to allow meaningful comparisons. Total cubic yards of various services were computed, along with costs with and without various taxes and fees. The resulting database included 563 months[12] of invoices from Schools and Districts around the State.

Results Reporting Average Cost per Cubic Yard

Figure 2.3 shows the overall costs per cubic yard for trash, recycling, and organics in the "extra tax" and no-County-tax areas, and the cubic yards of service subscribed, on average. Given that, in general, the

[11] See Figure 3.6 later in the document for the conversions used.

[12] The analyzed data from tax areas included 129 with TRO (trash, recycling and organics), 207 with TR service (trash and recycling), and 72 with trash only bills. The invoices from non-tax areas included 29 with TRO service, 109 with TR service, and 18 with trash-only bills.

Schools in the areas with the extra County Solid Waste tax are larger, the lower average CY of trash subscribed is an interesting finding.

Figure 2.3. Costs per Cubic Yard (CY) in Areas with and without Extra County Solid Waste Tax– Simple Calculation

	Areas with County Trash Taxes			Areas WITHOUT County Trash Taxes		
	Trash service only (T)	Trash and recycling service (TR)	Trash, recycling and Organics (TRO)	Trash service only (T)	Trash and recycling service (TR)	Trash, recycling and Organics (TRO)
Trash cost $/CY	$6.0	$14.7	$18.1	n/a	$13.5	$4.1
Recycling cost $/CY	n/a	$6.5	$8.0	n/a	$6.0	$1.3
Organics costs $/CY	n/a	n/a	$10.9	n/a	n/a	$5.3
Total cost $/CY	$6.3	$12.8	$15.5	n/a	$12.9	$3.4

The results are difficult to explain.[13] At the least, we would expect trash costs to be higher in extra-tax areas than no-County-tax areas, but these simple comparisons do not show that result. The results for TRO (trash, recycling, and organics) in the extra-tax areas may tell a sensible story – trash costs are highest, with recycling costing less than organics. However, in the no-County-tax areas, we might not have expected recycling to be lower than trash, even though the 17% state tax is embedded in the trash cost. In the extra-tax areas, we also see total costs per cubic yard increase as services increase (the bottom row), but if the trash tax is high, then trash only costs should presumably be higher, or at least not so much lower, than when other services are included. Most importantly, we would not have expected that trash costs (top row, not combined costs) would increase significantly in moving from trash only, to TR, to TRO.[14], [15]

There are many factors and influences embedded in these tables including regions and other factors; most importantly, the simple analysis essentially spreads collection costs across cubic yards, when it is in fact, a fixed cost component, muddying comparisons of large and small service. To better disentangle the results, we conducted a second, more complicated analysis.

Multivariate / Detailed Cost Analysis

Cost comparisons are more complicated than a simple comparison of average cost per cubic yard. That simple comparison ignores the fixed cost of getting a truck to the door, vs. the per-cubic-yard fee that is associated with "more vs. less" or "bigger vs. smaller". We used multivariate regression analysis to try to tease out the two-part costs associated with trash, recycling, and organics for Schools and Districts in the State. The model allowed us to separately assign costs to a fixed, "stop or collection" portion of the bill vs. a portion that varied with the specific cubic yards of material collected in association with each invoice. Models were separately estimated for each material (trash, recycling, and organics), and for the

[13] And we ran tables exploring cost by types of School, and other features and had similarly inconclusive results.

[14] We were able to disentangle some of the competing influences and confusing results for the tax areas by separating Hennepin County from the remainder of the tax areas. Hennepin's costs appear to be substantially higher than the other tax areas, and their rates influence the findings. However, this analysis still indicated total costs are highest under the recycling scenario.

[15] Note that we conducted an analysis of cost per cubic yard for commercial billing in the Metro area of Minnesota for the SWMCB. This report found simple cost per cubic yard (CY) rates as follows from its Figure 4.9: Trash $29/CY ($40 including taxes / fees); Recycling $25/CY ($8 for 4 CY or more); Organics $51/CY. For more detail, see report prepared by Skumatz Economic Research Associates (SERA) / and JL Taitt & Associates, "Solid Waste Management Coordinating Board: Commercial Cost and Billing Research", April 2013, (authors Freeman, et. al.)

extra-tax vs. no-County-tax areas of the State. The results of the estimations are presented in Figure 2.4, [16] and, as expected, the results are more consistent and logical than the results of the simpler analysis that combined cubic yard and stopping costs.

Figure 2.4 indicates that trash is the least expensive way to deal with solid waste in areas of the state that do not have the extra County-level solid waste / trash tax, but that the solid waste tax surcharge imposed in a number of counties has dramatically changed the economics of recycling. Looking at the cost per cubic yard, the invoiced impact of the additional tax (assuming it is all imposed on the trash element of the bill) makes solid waste management of material as trash, the most expensive option. Also, given that "getting a truck to the door" should be fairly similar, whether or not the truck collects trash, recycling, or organic, the decrease in the collection component for recycling and organics as compared to trash may indicate that haulers give "deals" if Schools have more than one material collected by the same entity.

Figure 2.4 Invoice Cost Analysis for Three Streams, Decomposed for Collection Cost[17]

	Collection Component (per collection per month)	Cost per cubic yard collected per month ($)
Trash - in Counties charging extra solid waste tax	$23 ($12-34)	$19 ($17-21)
Trash – in No-County-Tax Counties (includes state tax)	$23 ($12-34)	$6 ($0-13)
Recycling	$9 ($5-15)	$7 ($6-8)
Organics	$7 ($0-$14)	$12.50 ($11-14)

- *Note / implication for increasing diversion: The extra solid waste tax[18] in some of the metro-area counties has dramatically shifted the economics of the resulting invoices for trash, recycling, and organics – making both recycling and organics potentially cost-effective in Schools in those areas. Since virtually all of the organics programs in place are in the tax-including counties, it appears that a strategy of imposing a similar surcharge in additional counties could spread organics programs more broadly – if and only if there are facilities for processing, of course. It also appears that haulers may offer deals for collection costs for accounts that contract for more than one service (trash and recycling or recycling and organics).*

2.4 Best Practices Strategies for Schools to Increase Diversion

The invoice analysis above indicates that savings can be achieved at almost all schools if recycling is increased[19], and in some cases, savings may also be achieved from separate collection of organics. For a school to maximize savings potential, it may benefit from considering collection, organization, practices, or other solid waste system changes that can divert more materials from the waste stream. However,

[16] The ranges beneath the estimated dollars (per stop or per cubic yard) are the 95% confidence interval ranges.
[17] Note that there was some increase in per cubic yard costs for recycling and organics in the tax areas; prices were quoted higher in that area than in the more rural areas.
[18] A tax on trash that is on top of the state-wide tax.
[19] And the on-site analysis in Section 3 further illustrates savings from more recycling.

many schools face "barriers" that can make diversion and waste reduction more complicated; others may not be aware of some of the best practices used in schools around the State and nation. In this section, we list approaches that can help schools reduce disposed tonnage, and increase recycling (leading to almost certain savings), or increase organics diversion (with a trickier answer about whether savings will occur).

The strategies are listed and briefly described in Figure 2.6. The strategies address best practices for areas of:

- Contracting
- Reduce / reuse in-house
- Setting up a program
- Bins / recycling programs
- Cafeteria organics strategies
- Outreach / participation, and
- Funding / cost-reduction.

However, an inventory may not be as useful to schools facing various barriers, as a tailored list, identifying those strategies that are best suited to their situation. Schools or Districts with specific concerns may turn to Appendix F, which includes more detailed information designed to identify the subset of the strategies that are most suited to their situation. The Appendix identifies "conditions" that may be recognized by Schools, and the Appendix links strategies to each of these conditions:

- Those wanting to start programs
- Those in rural areas with few haulers or few program opportunities
- Those in urban areas or with lack of space considerations,
- Areas where haulers don't offer certain programs, or the expenses are high
- Schools in which the District makes decisions, vs. local decision-making
- Large vs. small District (big volumes of materials vs. small)
- Schools with student / staff interest and those without, or with / without staff
- Strategies addressing contamination
- High School vs. elementary strategies
- Food prep on-site or not.

Again, these strategies help Schools and Districts reduce the amount of trash, and increase either recycling or organics diversion or both. Note that whether the Schools will save money or not depends partly on the region of the state, as noted in the invoice analysis above. For those schools already recycling, implementing strategies that increase recycling are almost certainly likely to improve savings. For organics, the benefits are far more likely to occur if the School or District is located in one of the Counties with the extra solid waste tax, and for those Schools considering new (organics) programs, whether savings result also depends on whether the behavior(s) being considered will increase diversion enough to reach a "threshold" of being able to pay (the fixed costs) for a new collection.

Figure 2.6: Best Management Strategies for Increasing Diversion (Recycling and Organics) from Schools

ID	Practices	Descriptions
1	**Contracts**	
a	Have copy of Contract	This allows Schools to make verify service levels, know if they can make changes, know if there is automatic rollover to next year, or find how to cancel if needed or add extra service.
b	Have clear line items	This is essential for comparing service prices, understanding any additional costs or taxes, and verifies service provided is correct.
c	Determine SW Tax	The State of Minnesota charges a Solid Waste Tax on trash, but not on recycling or organics. Many counties or cities charge additional solid waste tax. Avoiding this tax through recycling and organics service can reduce solid waste costs.
d	Renegotiate	Many times if additional services are requested a hauler many adjust the original contract rate or give discounts with multiple services. Also if there is competition in the area for waste services Schools may be able to get a better rate from a long standing contract. Your service and materials have value.
e	Go out For Bid	Going out for bid every few years ensures that you are getting the best rate possible and allows you to compare if new options are available.
f	Ask for a waste audit	Many haulers will provide a waste audit to see if you are maximizing your services, have the right service levels, or could benefit from adjusting your service. Some will do this automatically, but not all. Including this in your contract or checking to see if it is available can ensure accurate service levels.
2	**Reduce/ Reuse/ In House**	
a	Reuse in Class projects	Uses recycled material in classroom projects and donate edible food to homeless shelters. Have classroom scrap paper stacks
b	Scrap Paper Stacks	Each class room should have a stack for paper that is reusable or only printed on one side.
c	Edible food to charity	Excess edible food that has not been served or is packaged can easily be used to feed hungry people.
d	Offer Versus Serve	Offer Versus Serve allows students to decline some of the food offered in a School lunch or breakfast program while still meeting federal nutritional standards. This strategy reduces food waste by not making students take food that they don't like or won't eat
e	Zero-Waste Lunches	Zero-Waste Lunches avoid waste generation by eliminating packaging that creates waste. Encourage parents to pack a zero waste lunch once a week to begin.
f	Vermicomposting	Vermicomposting is the practice of using worms to transform non-meat or non-dairy food scraps into a nutrient-rich finished product called vermicompost
g	Composting/ School Garden	School gardens are a great place to begin a composting or vermicomposting project and can be used in the School garden.
h	Duplex Printing	All staff and students should be printing on both sides of papers to reduce waste.
3	**Steps to Setting Up Program**	
a	Green Team	Organize a Green Team- this should include a sustainability staff person or a hired/ volunteer site coordinator. Also include administrators, custodians, students, teachers, and parents. Determine level of enthusiasm for all parties and determine if there will be support for the program. See if anyone has creative ideas that may overcome School specific obstacles.
b	Waste Assessment	Conduct a waste assessment to see how much trash is going out and what it is made of. Custodians can find simple sort ideas on line. Or if have basic program see what works,

ID	Practices	Descriptions
		what are the problems.
c	Target Materials	Decide on what recyclable or reusable materials make up the largest amount of volume and make most sense to target.
d	Recycling options	Find available haulers and rates or see if current contract can be adjusted. Look for alternatives such as food to hogs or options for processing/ reusing material on site. Find out if there is revenue sharing incentives for recyclable material. Should you go directly to recycler instead of hauler? Will staff or volunteers need to take material to recycling center?
e	Develop Plan & Logistics	Brainstorm with Green Team to establish a goal and gain District approval (if needed). Determine funding for bins, labeling, types needed such as for office paper or container drainage and placement. Discuss storage for materials, tracking and student involvement, site (cafeteria) monitors and outreach.
f	Educate/ Promote	A program cannot be successful without the involvement of all those in the School. Make sure to announce well in advance, have signage on all bins, train staff and students or any assisting.
g	Evaluate/ Adjust/ Feedback	Monitor throughout the process to determine whether there are adjustments that need to be made to reach goal. Get feedback from team members. Set a tracking chart so students can see the results of their efforts. Monitor trash service as well to verify levels are decreasing.
4	**Bins/ Recycling Program**	
a	1 per trash can	Always have a recycling bin next to a trash can to encourage usage.
	Consistency	Keep bins in the same place for convenience and to develop good habits.
b	All areas	Have bins not only in hall ways and cafeterias, but also in offices, classrooms, teacher/ staff lounge areas, entrances, near vending machines, art rooms, gymnasiums and restrooms.
c	Make them Fun	Make the bins stand out with bright colors, fun stickers, or student art.
d	Always label	On the bin or nearby make sure there is a list of what's ok and what's not. Clearly label with easy to see graphics.
e	Verify levels	Check status of outside dumpster before pickup. Some haulers don't weigh and may charge you for full container. Also if dumpsters are consistently not full, sizes or frequencies may be reduced.
5	**Cafeteria/ Organics**	
a	Offer Versus Serve	Offer Versus Serve allows students to decline some of the food offered in a School lunch or breakfast program while still meeting federal nutritional standards. This strategy reduces food waste by not making students take food that they don't like or won't eat
b	Zero-Waste Lunches	Zero-Waste Lunches avoid waste generation by eliminating packaging that creates waste. Encourage once a week parent to pack a zero waste lunch.
c	Compostable Trays	Those that can be put in the organics bin or compost pile.
d	Reusable Trays	Many Schools already have dishwashers or install one and wash trays.
e	Take out Trays	"Substituting a [cardboard] carry-out tray, which costs less than the foam tray and can be recycled, is critical to reducing the lunch waste stream and saving on disposal costs." From Davis Schools Report
f	Stack Trays	Disposable trays take up a lot of room in trash, stack them to save space.
g	Animal Feed	Food to Hog type programs for food that is not able to be eaten by humans but still have nutritional value.
h	Bottle/ Single Use Container Bin	Cafeteria waste is high in single use drink containers. Make sure bins are labeled and next to trash.

ID	Practices	Descriptions
i	Liquid Dumping Container	Preferable containers should be rinsed, but at minimum they should be emptied. Have a bucket next to the recycling bin to empty liquids that can later be poured down the drain.
j	Composting on site	Composting inedible food scraps from a food preparation or dining area, except meat and dairy products, can be done on-site or taken to a composting facility that is permitted to accept food scraps
k	School Garden	School gardens are a great place to begin a composting or vermicomposting project and can be used in the School garden.
l	Vermicomposting	Vermicomposting is the practice of using worms to transform non-meat or non-dairy food scraps into a nutrient-rich finished product called vermicompost
m	Rolling Carts	Save staff time by having rolling carts to speed things up or allow students to help.
n	Recycling Monitor	A staff person, teacher or volunteer to monitor materials go in proper bins in the cafeteria and help avoid contamination.
6	**Outreach/ Participation**	
a	Announcements/ Reminders	Give reminders during School announcements or at assemblies
b	Art Contests	Have a recycling art contest and post winners throughout the School or on all recycling bins. Create artwork from recycled material.
c	Best in District Contests	Have contests throughout the District for best School recycler.
d	Student Helpers	Have students help collect materials and bring to central bins, sort or monitor and train to spot contamination.
e	Curriculum	Use programs results for writing or statistic curriculum in older grades, or for science projects like vermicomposting.
f	Guest Speaker	Consider inviting a guest speaker to inform students on benefits of recycling or current trends.
g	Progress reports	Announce or report progress on a regular basis such as a chart in the cafeteria showing the results of their efforts. If students can see that their activities are having an effect t, they will be more engaged with the program.
h	School Slogan	Create a slogan that is easy to say and unique to the School or District.
i	Field Trips	Take a field trip to a recycling facility or landfill.
j	Volunteer Credits	Give students volunteer credit hours when they help with sorting or monitoring. These credits can be used for scholarships, college applications, or volunteer clubs. Set hours and schedules can be established and used to help reduce costs and increase involvement in the program.
k	Student Video	Have students create an informational video that will be shown during announcement or assemblies.
l	Municipal Staff/ Outreach	See if there is a staff person from the local municipality who can provide advice or has outreach materials to for the students, parents, or teachers.
7	**Funding/ Cost Reduction**	
a	Revenue Sharing	Schools receive a percentage of the sales from recyclable material either from the hauler or from processors. (ex. Urban Corps and San Diego Schools, The San Gabriel Valley Conservation Corps, CA, Knox County Schools, TN, Pierce Co Schools, WI sell Aluminum).
b	Volunteers for drop off	Many parents volunteer regularly at Schools and may be willing to help deliver recyclables. Many Schools often have a staff person already taking small amounts of recyclables.

ID	Practices	Descriptions
c	Grants	Many states, School Districts, communities and even businesses offer grants to help with recycling programs.
d	Recycling Fundraisers	Many companies will take old cell phones, toner and ink cartridges in return for cash. (ex. Funding Factory). Collect aluminum cans and take to recycler. Funding from this can help pay for other type of programs.
e	Hauler provides cart	Check with the hauler to see if they will include the cost of carts in the contract.
f	Right Sizing Containers	Check status of outside dumpster before pickup. Some haulers don't weigh and may charge you for full container. Also if dumpsters are consistently not full, sizes or frequencies may be reduced.
g	Occupational Students	In High Schools, occupational diploma students can be used to help pickup, deliver or sort recyclables.
h	Skip and Rinse	Skip the additional cost of organic liners and give bins a quick rinse instead.
i	Break down/ Stack	Make sure custodians or student helpers are breaking down all boxes and stacking lunchroom trays to save space and reduce volume.
j	Municipal Staff/ Assistance	Many municipalities have free audits, recycling for Schools or help with bins and other start up costs.

***Sources for Strategies in the Table**:*

Skumatz Economic Research Associates analysis; CalRecycle ; file:///C:/Documents%20and%20Settings/Admin/My%20Documents/SOLIDWASTEVarious/BestPracticesSchoolRecycling/CASchoolRecycling.htm; Davis, CA, "Davis Joint Unified School District Food Waste Diversion Project FINAL REPORT"; 2001.file:///C:/Documents%20and%20Settings/Admin/My%20Documents/SOLIDWASTEVarious/BestPracticesSchoolRecycling/DavisCA_foodscrapsSchoolProgram.pdf; St. Paul-Ramsey County Dept. of Public Health. "Best Practices How to Implement a School Recycling Program" 2010; Virginia Recycles Association A Guide for Implementing a School Recycling Program; file:///C:/Documents%20and%20Settings/Admin/My%20Documents/SOLIDWASTEVarious/BestPracticesSchoolRecycling/Catch_the_cycle_VAhowto.pdf; New York City Recycling Champions Program; School Nutrition Association, "Recycling & Waste Management Practices in School Nutrition Programs", 2007.; York County District 3, South Carolina, "Rock Hill Schools Recycling Program Handbook"; Cherry Creek Schools, CO, "Recycling in Cherry Creek Schools- Best Practices Manual", 2012-2013.

SECTION 3: SCHOOL SITE ASSESSMENTS

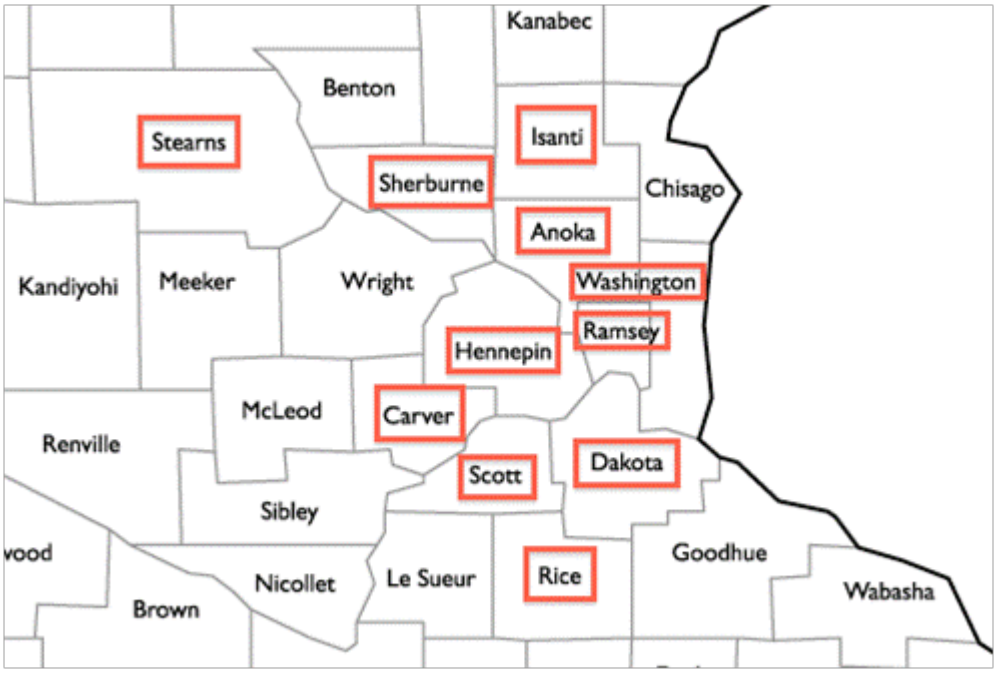
3.1 Introduction

Section 3 provides an overview of the School site assessments conducted by the SERA/JL Taitt Team at twenty-one (21) public Schools. The on-site assessments included an evaluation of the Schools' waste management, recycling collection and organics diversion system (if applicable) and a detailed interview with key personnel. As part of the assessment, a financial analysis of 12 months of invoices and a review of contract language was conducted.

The Sample

The database of online survey respondents was used to identify a representative sample of 21 Schools—comprised of eight (8) elementary, six (6) middle and seven (7) high Schools—located in 15 independent School Districts within the following 11 Minnesota counties (highlighted in red) (See Figure 3.1).

Figure 3.1: Distribution of School Site Assessments by County



With a total enrollment of 22,048 students, the Schools are located in the following areas:

Figure 3.2: Distribution of School Site Assessments by Location

	Urban	Urban/Suburban	Suburban	Suburban/Rural	Urban/Rural	Rural
# Of Schools	4	4	6	3	2	2

During the School year, the Schools spent a total of $21,271 a month for solid waste management services and supplies (compostable bags) and received the following mix of services:

Figure 3.3: Distribution of School Site Assessments by Collection Method

	Waste Management		Recycling Collection		Organics Diversion	
	Dumpster Services	Compactor Services	Dual Stream	Single Stream	Food To-Hogs	Compost
# Of Schools	16	5	10	11	5	6

Methodology

The School site assessments occurred between March 25, 2014 and May 1, 2014. School District personnel participating in the surveys routinely included a director or supervisor of facilities, buildings and grounds or plant operations and the head custodian. At some Schools, principals and teachers also participated in the survey.

The goal of the site assessments was to observe and evaluate:

- District leadership and top-down support
- Adult direction and supervision in Schools
- Trash, recycling and organics collection container infrastructure including labels, signage and posters
- Education, awareness and student participation in service learning
- School needs (e.g., containerization, labels and signs, adult supervision of students)
- Building barriers (e.g., storage space, loading dock/service access)

In addition to the on-site evaluation, the following information was requested for each School:

- Copies of twelve (12) months of invoices for waste, recycling and organics services
- A copy of contract(s) for waste, recycling and organics services
- A diversion rate estimate, if available
- The per unit cost to purchase compostable bags, when applicable
- A copy of a District-wide policy for waste reduction and recycling, if one exists

To gain an understanding of the costs for solid waste management services and the potential for net cost reduction for Schools that utilize recycling and organics best practices, permission was requested from the survey participants to contact and obtain from their haulers: (1) an estimated cost for services if their School managed all discards as trash; and (2) an estimated cost for services if their School increased their diversion rate.

3.2 Summary of Findings

School Performance

Based on an analysis of the information gathered, Schools were given one of three rankings:

1. High performance Schools

2. Medium performance Schools
3. Low performance Schools

The evaluation criteria used to rank School performance includes:

- District leadership and top-down support
- Adult direction and supervision of student participation
- Collection container infrastructure
- Education, awareness and service learning opportunities for students
- Estimated diversion rates

An estimated diversion rate in Figure 3.7 (and the expanded Table in Appendix C) summarizes the resulting rated performance of Schools. Figure 3.7 shows two Schools were ranked high performance Schools, nine Schools were ranked medium performance Schools, and ten Schools were ranked low performance Schools.

District Leadership & Top-Down Support, and Adult Direction & Supervision of Student Participation

Strong District leadership and top-down support results in Schools with high performance recycling and organics programs. When District leadership trickles down to School principals, faculty and staff, students receive the consistent adult direction and supervision they need to be successful participants in recycling and organics diversion programs. With top-down leadership, teachers and staff are able to create a "School culture" of recycling/organics education, awareness and student service-learning roles and responsibilities supported by consistent adult direction, supervision and expectations. Without top-down leadership, Schools with highly committed teachers and staff providing students direction and supervision are at risk due to staff turnover and attrition.

Among the Schools evaluated on site, strong District leadership and top-down support is a hallmark of the two high performance Schools. Teachers and staff emphasize an awareness of recycling and organics recovery; educate students on how to divert materials from the waste stream; and students have service-learning roles and responsibilities such as collecting recyclables throughout the School and consolidating them for custodians to transfer into recycling dumpsters.

One-third of the medium performance Schools and one of the low performance Schools have varying levels of District leadership and support. Without District leadership and top-down support, teacher and staff direction and supervision of student participation within School buildings is limited and recycling and organics diversion programs struggle.

District Waste Reduction & Recycling Policy

Nine of the 15 School Districts that participated in the School site assessments have a District waste reduction and recycling policy approved by their School board. While the policies vary from District to District, a sample policy is provided in Appendix D. The two high performance Schools and two-thirds of the medium and low performance Schools are in Districts that have waste reduction and recycling policies.

Collection Container Infrastructure

Collection container infrastructure is fundamental to successful recycling and organics diversion programs in Schools. Among the Schools evaluated on site, a best practices collection container system (described below) is characteristic of the two high performance Schools. The remaining 19 Schools need varying degrees of assistance with basic infrastructure such as collection containers, labels and educational signage and posters. Schools perceive lack of funding as a barrier to improving collection container infrastructure. Some Schools have received financial assistance from state and local governments to upgrade their collection containers, lids and labels.

Among the Schools evaluated on site, three "generations" of collection container systems emerged:

1. **First Generation Collection Container Systems** comprised of city curbside recycling bins and old cardboard boxes. Seven or 33% of the Schools evaluated on site have first generation collection containers where curbside bins or boxes are often placed under tables or tucked into corners. Trash containers are large and more convenient to use. There are no labels, signage or posters.

Figure 3.4: Examples of First-Generation Container Systems

2. **Second Generation Collection Container System** where recycling collection containers are more equal in size, shape and stature to trash containers. The trash and recycling containers are not consistently paired and Schools could use more containers throughout the buildings. The containers may or may not have lids and they may or may not have labels, signage or posters. Twelve or 57% of the Schools evaluated on site have a variety of second generation collection containers.

Figure 3.5: Examples of Second-Generation Container Systems

3. **Best Practices Collection Container System** comprised of color-coded trash and recycling containers with lids and labels consistently placed in classrooms, offices, hallways and cafeterias that visually demonstrate the type of material that can be collected. The pairing of recycling and trash containers makes recycling as convenient as using the trash container. Recycling containers are larger to capture greater volumes of paper waste and other recyclables. Large recycling containers visually demonstrate that most of the waste in classrooms is recyclable.
   Two or 10% of the Schools evaluated on-site, have best practices collection container systems.

Figure 3.6: Examples of Best Practices Container Systems

Estimated Diversion Rates

Diversion rates indicate how much material is captured from the waste stream through recycling and organics diversion programs, but do not include information on waste generation. Ideally programs will aim to reduce the quantity of waste generated in addition to aiming to capture high volumes of material through recycling and organics recycling (e.g., high diversion) efforts.

Diversion rates were available for five Schools from tonnage reports provided by haulers. For the remaining 16 Schools, diversion rates were estimated using the following densities:

Figure 3.6: Material Density Assumptions Used in Computations

Material	Density (lbs./cu yd)[1]
Mixed Paper	484
Cardboard	100
Bottles & Cans	200
Tin Cans	150
Single Stream Recycling	139
Trash	125
Source Separated Organics	185
Food Waste	160 lbs. per 32 gallon barrel

[1]*Sources: Recycle More Minnesota Fact Sheet (www.recyclemoreminnesota.org/toolkit/RMM_trackingwaste.pdf), Standard Volume-to-Weight Conversion Factors (www.epa.gov/osw/conserve/tools/recmeas/docs/guide_b.pdf), Dick's Sanitation, Barthold Farm*

The following table summarizes the estimated diversion rates by School performance and the mix of recycling and organics diversion programs implemented by the Schools.

Figure 3.7: Estimated School Diversion Rates for School Site Assessments

School Performance	Recycling Program	Recycling & Food-To-Hogs Program	Recycling & Compost Program
High			71% 75%
Medium	40% 53%	44% 45% 47% 51%	41% 44% 59%
Low	17% 21% 31% 33% 33% 35% 35% 41%	44%	32%

Organics Recovery

The recovery of organic waste in Schools has the potential to significantly increase diversion rates. The weight of heavy, wet food waste is the driver to increasing diversion rates whether Schools implement a food-to-hogs or compost program. What make organics diversion programs successful are consistent adult direction, supervision and expectations of students in the cafeteria, as well as program logistics that support efficient operations for staff on a daily basis.

Eleven or 52% of the Schools have implemented organics recovery programs. Five Schools have food-to-hogs programs, and six Schools have compost programs. Below are some of the observed challenges with these programs:

- Lack of adult supervision at cafeteria sort line results in cross-contamination of materials in compost and trash collection containers.
- Because of no adult supervision at cafeteria sort line, students have gone back to trashing all of their discards. Compost barrels are being used for trash. Custodians no longer put compostable bags inside compost barrels.
- There is no adult supervision of food-to-hogs barrels, and about once a week custodians have to trash the contents of food waste barrels due to contamination.
- It takes two people to lift compost barrels into dumpsters because they are heavy.
- There are no wheeled dollies on food waste barrels, and a two-wheeled cart is used to move barrels out of the cafeteria. Barrels are allowed to fill only one-third to one-half full or they are too heavy to wheel outside on a cart.
- Compost barrels are allowed to fill only one-third to one-half full or compostable bags will break from the weight of organic materials, and loose organics spill into the dumpsters. Compost bags are not fully utilized, and they are expensive.

Program Costs

The following method was used to gain an understanding of the costs for solid waste management services and the potential for net cost reduction for Schools that utilize recycling and organics best practices:[20]

- An analysis of twelve months of invoices to baseline current costs
- An analysis of pre-organics program costs, when available
- An estimated cost for services if Schools managed all their discards as trash
- An estimated cost for services if Schools increased their diversion rates

A complete summary of cost data is provided in Table 1 in Appendix C. Highlights of program cost findings follow.

Pre- and Post-Organics Program Costs

For three Schools that launched compost programs, pre-program cost data were available. A summary of pre- and post-organics program costs is provided below. Pre- and post-program costs, including all taxes and fees, do not include the cost for traditional plastic bags (non-compostable).

Figure 3.8: Pre- and Post Organics Program Costs for School Site Assessments

Program	School (and diversion rate)	Pre-Organics: Monthly Waste & Recycling Services Cost	Post-Organics: Monthly Waste, Recyc. & Compost Services Cost	Post-Organics: Monthly Cost for Compostable Bags	Post-Organics: Total Monthly Cost for Waste, Recyc. & Compost Services & Compostable Bags
Recycling & Compost	Dakota County Elementary (71%)	$436	$355	$167 ($0.80 per bag)	$523
	Washington County Middle School (47%)	$840	$778	$80[1] ($0.60 per bag)	$858
	Hennepin County High School (45%)	$1,524	$1,764	$234 ($.41 per bag)	$1,998

[1]*Cost for compost bags used by kitchen staff only. Students do not participate in the compost program.*

All three Schools experienced increased costs after the launch of their organics programs, ranging from $18 to $474 a month. For two Schools, monthly hauler service costs decreased (by 7-19%) after the launch of their compost programs. However, the added cost of purchasing compostable bags increased their total overall cost; the increases ranged from 2% to 31% net after including bag costs).

[20] The program costs – current and potential changes – were based on an assessment of the current situation, and if they were already recycling, the savings were estimated by comparing to hauler statements of the likely invoices if all materials were treated as trash, and if they were not, then hauler costs for a new scenario incorporating recycling deemed feasible by JL Taitt & Associates were compared. The hauler cost estimates were gathered by calls conducted by Skumatz Economic Research Associates (SERA) staff from the haulers.

Estimated Costs

Data were available for ten Schools to make the following cost estimates:

- An estimated cost for services if Schools managed all their discards as trash
- An estimated cost for services if Schools increased their diversion rates

To develop estimated costs for services, fixed rate structures were available for some Schools and adjusted service levels were applied to them. When rate structures were not available, service levels were adjusted and hauler price quotes were obtained.

Diversion rates were increased based on the assumption that recycling volumes increased. Assumed diversion rates are detailed for each School in the expanded Table in Appendix C.

A summary of estimated costs, including all taxes and fees, is provided below.

Figure 3.9: Estimated Monthly Service Costs (incl. taxes and Fees) for School Site Assessments

Program	School (and diversion rate)	Current Monthly Solid Waste Services Cost (existing recycling)	Hauler Quote for Total Monthly Service with Increased Recycling Diversion	Hauler Quote for Total Monthly Service Cost if All Discards Managed as Trash
Recycling	Stearns County Elementary (17%)	$407	$382	Not available
	Anoka County High School (40%)	$805	$736	$1,270
	Ramsey County Middle School (41%)	$1,007	$810	$1,535
	Isanti County High School[1] (33%)	$640	$386	$964
	Anoka County Elementary (31%)	$633	$558	$489
	Stearns County Elementary (53%)	$689	$753	$1,821
Recycling & Food-To-Hogs	Isanti County Elementary[1] (51%)	$1,130	$763	$1,707
	Hennepin County High School(45%)	$2,309	$2,013	$3,067
	Ramsey County Middle School (44%)	$1,510	$913	$1,626
Recycling & Compost	Rice County Middle School[2] (59%)	$1,402	$1,204	Not available

[1] *This School is not charged for recycling services by its hauler.*
[2] *Includes cost for compostable bags.*

Nine out of ten Schools would decrease monthly service costs if their diversion rates were increased due to an increase in recycling volumes. The decrease in costs range from $25 a month for a Stearns County elementary School to $597 a month for a Ramsey County middle School. It is estimated that one School would increase its costs by $64 a month if it recycled more.

Nine out of ten Schools would increase their monthly costs significantly if they were to manage all of their discards as trash. The increase in costs range from $116 a month for a Ramsey County middle School to $1,132 for a Stearns County elementary School. It is estimated that one School would save $144 a month if it stopped recycling and managed all of its discards as trash.

Contracts

A significant barrier for Schools in managing their waste management costs is the lack of price controls surrounding the prices they pay for waste, recycling and organics services. As illustrated below, the majority of Schools surveyed do not have service contracts with their haulers. Of the six Schools with contracts, two are standard hauler contracts with pricing terms and conditions that favor the hauler and not the Schools.

Figure 3.10: Number of Contracts in Place in Visited Schools

# of Schools With Contracts	# of Schools Without Contracts	Unknown
6	13	2

3.3 Findings and Implications / Next Steps

The on-site work reviewed practices, program potential, and costs from 21 schools in 15 districts, with estimated diversion rates ranging from 17% to 75%. The analysis indicated that 90% of the schools analyzed would save money from recycling, and save more if they increased recycling, but that the cost of liner bags for organics containers could cancel out savings in both cases in which separate collection of organics would have been cheaper in hauler costs. Containerization varies widely, and improved performance can be achieved if schools and Districts work toward better practices in this area; color-coding, parallel locations, and clear signage can increase awareness, use, education, and diversion. The on-site work also led to some suggestions for various actors associated with recycling in the state, including the MPCA, the Districts, and the schools.

Recycling may increase if the MPCA works with the Minnesota Department of Education to create an inherent reason for Schools to educate students on how to recycle and divert organics by establishing academic standards for waste reduction, recycling and organic waste management. Linking these academic standards to graduation requirements in writing, reading and mathematics and including them in state tests that help Districts measure student progress such as the Minnesota Comprehensive Assessments (MCAs) would raise the priority of recycling at the School and District level. The MPCA could clearly assist School Districts in developing waste management service contracts with terms and conditions that include cost controls, rate structures with diversion incentives and mandatory right-sizing of trash, recycling and organics services. Costs of recycling are an issue, and MPCA could further assist in increasing recycling and diversion by helping Schools procure compostable bags at a lower per unit price, and helping them with the funding needed to implement best practices collection container infrastructure. Finally, MPCA could work with Schools to develop organics diversion program logistics that support efficient operations for staff on a daily basis such as managing heavy, wet food waste.

School Districts are in a key role in procuring, contracting, and overseeing solid waste services in schools. Districts can establish and/or update District waste reduction and recycling policies, and use the policies to obtain top-down administrative leadership and support for recycling and organics diversion programs. Higher recycling levels will result if the Districts work to upgrade collection container infrastructure on a District-wide basis to a best practices method comprised of color-coded trash, recycling and organics containers with lids

and labels consistently placed in classrooms, offices, hallways and cafeterias that visually demonstrate the type of material that can be collected. Cleaner organics streams can be achieved if the Districts can work to identify strategies to dedicate staff to consistently monitor and supervise students separating materials in cafeteria sort lines.

Schools can influence recycling substantially by providing top-down leadership in which principals, teachers and staff are able to create a "School culture" of recycling/organics education, awareness and student service-learning roles and responsibilities. The quality of recyclables – and the awareness of students – can be improved by providing students with consistent adult direction, supervision and expectations of students participating in recycling and organics diversion programs. Awareness and participation can further be enhanced if adults lead by example, a situation in which adults are participating in recycling and organics diversion programs and providing models for student behavior.

APPENDICES

(Included under separate cover)