

# **Report to the Governor and the Legislature:**

## **Examination of Sustainability Assessment for Carpet and Recommendation for Changes to the Standard**



California Department of Resources Recycling and Recovery

**January 1, 2014**

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Publication # DRRR-2014-1484

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# Executive Summary

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California is faced with the challenge of diverting or safely managing more than 400 million pounds of waste carpet generated in the state each year. Assembly Bill 2398 (Perez, Chapter 681, Statutes of 2010) enacted a product stewardship program for carpet to increase the amount of postconsumer carpet diverted from landfills and recycled into secondary products. One of the provisions of AB 2398 requires CalRecycle and the California Department of General Services to complete a study by January 1, 2014, that examines the Platinum Level of American National Standards Institute (NSF/ANSI) 140-2009 Standard for carpet that was in effect on January 1, 2011, or the most current version of the standard that the state uses to purchase carpets. It further requires CalRecycle and DGS to submit a report to the governor and the Legislature that includes recommendations for any appropriate changes to that standard that would further the intent of AB 2398 and improve the environmental sustainability of carpet purchased by the state.

NSF/ANSI 140, also called Sustainable Carpet Assessment, is a national standard for production of sustainable carpets and rugs and includes three levels of attainment (Silver, Gold, and Platinum). The standard enables organizations throughout the carpet supply chain to achieve sustainable attributes and demonstrate compliance. NSF 140 is a multi-attribute standard that includes life cycle principles and employs a point system with established performance requirements. The standard awards points for a number of mandatory and voluntary measures that are used to evaluate six key attributes of carpets:

- Public Health and Environment
- Energy and Energy Efficiency
- Bio-based and Recycled Content
- Manufacturing
- Reclamation and End of Life Management
- Innovation

NSF released an updated standard labeled as NSF 140-2012 in November 2012, which the state currently uses to purchase carpet and which is the subject of the study. In order to conduct a comprehensive study of the NSF 140-2012 standard, which covers multiple environmental attributes, CalRecycle and DGS assembled a multi-agency team with the requisite expertise to review the standard and compile a set of findings and recommended changes to the standard.

The multi-agency team consisted of: CalRecycle, DGS, California Air Resources Board, California Office of Environmental Health Hazard Assessment, and California Department of Public Health.

The multi-agency team began its study of the NSF 140-2012 standard in January 2013 by conducting an in-depth review and identifying potential changes to recommend for the standard. The team completed its work in spring 2013, at which time CalRecycle and DGS scheduled two workshops to gather broad stakeholder input on the standard and feedback on potential changes identified by the team.

The stakeholder workshops were well attended by a variety of stakeholders representing carpet manufacturers, recyclers, local governments, nongovernmental organizations, and procurement officials.

## RECOMMENDATIONS REGARDING THE STANDARD:

After a thorough review of the findings and careful consideration of comments received at the stakeholder workshops, the team developed a set of recommendations for proposed changes to the Platinum level of the standard. These recommendations, if implemented, will further the intent of AB 2398 and improve the environmental sustainability of carpet purchased by the state. The following recommendations are listed in order of priority, with additional emphasis on the first three due to broad stakeholder support and the potential for these recommendations to have a significant impact in realizing the intent of AB 2398:

1. **Revise Standard's Formula for Reclamation:** The standard's formula for reclamation should be revised to account for all the carpet manufactured by a manufacturer, rather than only the quantity of carpet a manufacturer certifies to the standard. This change would align the standard more closely with one of the primary intents of AB 2398, which is to increase the amount of postconsumer carpet that is diverted from landfills. It would result in carpet manufacturers needing to reclaim more of the carpet they manufacture in order to obtain certification at the Platinum level.
2. **Require Carpet to be 100 Percent Readily Recyclable for Platinum Level Standard:** The standard should include a new requirement that all carpet at the Platinum level of the standard be 100 percent readily recyclable\*.
3. **Include Standards for Both Commercial and Residential Carpet:** The standard should include two sections, one for commercial carpet and one new section for residential carpet. The current standard only covers commercial carpet and should be expanded, because residential carpet comprises 70 percent of carpet sales in California.
4. **Double Points Awarded Under the Life Cycle Analysis Standard:** The points awarded under the standard for conducting a life cycle analysis should be consolidated and doubled as an incentive for manufacturers to evaluate the cross-media impacts of their carpet. For the Platinum level, the standard should further require that the life cycle analysis demonstrate the carpet's reduced environmental impact relative to the current carpet industry baseline.
5. **Credit Manufacturers for Reducing Energy Consumption and Greenhouse Gases:** The standard should credit manufacturers for reducing their energy consumption relative to the current carpet industry average, and for reporting and reducing their greenhouse gas emissions. The standard should also be revised to incentivize the use of on-site renewable energy generation over the purchase of renewable energy credits.
6. **Lower the Weighting Factor of the Bio-Based Content:** The weighting factor of bio-based content under the standard should be lowered relative to the weighting factor of post-consumer content. Additionally, coal fly ash, which is mostly composed of silica, is qualified as post-industrial/pre-consumer content and thus is currently given credit. Granting credit for use of coal fly ash in the standard should be reconsidered because there is some concern regarding potential respiratory health impacts when carpet with high silica content is processed for recycling.

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\* Readily recyclable means that the carpet, regardless of the type of face fiber, when processed for recycling routinely results in no more than 10 percent of the carpet being disposed as residuals from the recycling process.

7. **Adopt the California Department of Public Health Standard Method:** The standard should adopt and reference the current California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, published in February 2010.
8. **Include a Reference Exposure Level:** The standard should include a Reference Exposure Level of 100 µg/m<sup>3</sup> for caprolactam.

#### **OPTIONS FOR THE LEGISLATURE:**

To implement these recommendations, CalRecycle and DGS believe consideration should be given to the following three legislative options:

1. Direct CalRecycle and DGS to work through the NSF International standards revision process to incorporate the recommendations listed above into the NSF 140 standard and to reference the new standard in the State Contracting Manual, the State Administrative Manual and in Buying Green: California's Guide for Sustainable Purchasing. While CalRecycle and DGS can pursue this option administratively, being directed to do so by the Legislature would further indicate California's priority to have revisions made to those involved in making decisions about the standard.
2. If these recommendations have not been approved by the NSF 140 ANSI standard committee by January 1, 2015, for incorporation into the NSF 140 standard in its next update, CalRecycle and DGS recommend that the Legislature direct DGS to include these recommendations in the state's carpet purchasing specifications for use when purchasing carpets for state-owned and -leased facilities (DGS lease agreements currently require carpet to be certified to the NSF standard at its Platinum level). Additionally, the NSF 140 standard should be referenced by DGS in the State Contracting Manual, the State Administrative Manual and in Buying Green: California's Guide for Sustainable Purchasing.
3. Direct CalRecycle and DGS to pursue option one and to incorporate these recommendations, or a subset of them, into the state's carpet-purchasing specifications, the State Contracting Manual, the State Administrative Manual, and Buying Green: California's Guide for Sustainable Purchasing, by January 1, 2015.

CalRecycle and DGS recommend option 1 as the preferred initial approach because incorporating these recommendations into the NSF 140 standard would ensure the recommendations would impact all carpet certified to the NSF 140 standard, not just carpet purchased by the State of California. Additionally, the California Green Building Standard Code and the Collaborative for High Performance Schools encourage the use of the NSF 140 standard for procurement of carpets. Consequently, incorporating these recommendations into the NSF 140 standard through the NSF International standards revision process will have a greater impact in realizing the intent of AB 2398 than simply applying these recommendations to carpet purchases made by the State of California. However, if CalRecycle and DGS are not successful in getting these recommendations incorporated into the NSF 140 Standard by January 1, 2015, then CalRecycle and DGS recommend option 2 as the subsequent action.

# 1. Introduction

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California is faced with the challenge of diverting or safely managing more than 400 million pounds of waste carpet generated in the state each year. AB 2398 (Perez, Chapter 681, Statutes of 2010) enacted a carpet product stewardship program to increase the amount of postconsumer carpet diverted from landfills and recycled into secondary products. In order to ensure manufacturers reach the intended goal of the bill, performance goals for post-consumer carpet were established that include: increasing reuse and recyclability, incentivizing market growth of secondary products, increasing recycling, and increasing diversion from landfills. As a means of assisting manufacturers in reaching these goals and improving the environmental sustainability of carpet purchased by the state, AB 2398 also required CalRecycle and DGS to complete a study by January 1, 2014, that examines the Platinum level of American National Standards Institute (NSF/ANSI) 140-2009 Standard for carpet that was in effect on January 1, 2011, or the most current version of the standard that the state uses to purchase carpets, and to submit the report to the governor and the Legislature, including recommendations for any appropriate changes to that standard.

NSF/ANSI 140, also called Sustainable Carpet Assessment, is a national standard for production of sustainable carpets and rugs. This standard was originally developed in 2007 through a public process by a multi-stakeholder group of manufacturers, suppliers, regulatory agencies, customers, academics, and other industry participants. The standard enables organizations throughout the carpet supply chain to achieve sustainable attributes and demonstrate compliance. NSF 140 is a multi-attribute standard that is based on life cycle principles and employs a point system with established performance requirements. The standard awards points for a number of mandatory and voluntary measures in the following categories:

- Public health and environment
- Energy and energy efficiency
- Bio-based and recycled content
- Manufacturing
- Reclamation and end-of-life management
- Innovation

Each category has one or more prerequisites that must be met in order to comply with the standard. Once all prerequisites are met, a carpet manufacturer may earn additional credit points that can be used to reach higher levels of certification. The NSF 140 standard includes three levels of attainment: Silver, Gold, and Platinum. The Gold and Platinum levels recognize good and better levels of performance and require a minimum of 52 and 60 points respectively; Silver certification can be achieved by accumulating 37 points. To demonstrate compliance with the standard, a carpet manufacturer must go through a third-party certification process, which includes a review of documentation demonstrating that all prerequisites have been met, verification of credits earned, and an on-site audit of the manufacturing facility(s).

NSF released an updated NSF 140-2012 standard in November 2012 that the state currently uses to purchase carpet and thus is the subject of this report. In order to conduct a comprehensive study of the NSF 140-2012 standard, which covers multiple environmental considerations, CalRecycle and DGS assembled a multi-agency team with the requisite expertise to review the standard and compile a set of recommended changes. The multi-agency team consisted of CalRecycle, DGS, California Air Resources

Board, California Office of Environmental Health Hazard Assessment, and the California Department of Public Health.

## 2. Findings and Recommendations

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The multi-agency team started its study of the NSF 140-2012 standard in January 2013 by conducting an in-depth review and identifying potential changes to the standard that would help realize the intent of AB 2398. The team completed its work identifying potential changes in spring 2013, at which time CalRecycle and DGS scheduled two workshops to gather stakeholder feedback on the standard and input on the potential changes identified by the team. To facilitate meaningful stakeholder input on the recommended changes to the standard, NSF International provided free access to the NSF/ANSI 140-2012 Sustainability Assessment for Carpet standard for three weeks in June 2013. This courtesy enabled stakeholders to review the standard and provide informed comments on the recommended changes.

The stakeholder workshops, which took place in June 2013, were well attended by stakeholders representing carpet manufacturers, recyclers, local governments, nongovernmental organizations, and procurement officials. After a thorough review of the findings from the team, and careful consideration of comments from the stakeholder workshops, the team developed the following set of recommendations for proposed changes to the Platinum level standard to further the purposes of AB 2398 and improve the environmental sustainability of carpet purchased by the state.

### 2.1 Product Reclamation

Reclamation refers to how much a carpet manufacturer collects of its own carpet (or similar carpet by another manufacturer), or demonstrates that it has a financial or contractual instrument in place to reclaim its carpet, for purposes of recycling. The following formula is currently used for calculating the reclamation rate:

$$\text{Reclamation Rate} = \text{pounds of all product reclaimed (annually)} / \text{pounds of annual production of product being certified}$$

The formula used in the standard to derive the reclamation rate does not provide an accurate representation of how much carpet is reclaimed. Limiting the denominator to NSF 140 certified products results in carpet manufacturers calculating an inflated reclamation rate that is based only on their production of NSF 140 certified carpet, rather than a reclamation rate based on all the carpet they produce. The reclamation rate calculation formula can be refined to more accurately represent how successful each carpet manufacturer is in reclaiming carpet and diverting it from landfill disposal. A manufacturer must have a 15 percent reclamation rate to obtain Platinum certification.

Therefore, we recommend:

The standard's formula for reclamation should be revised to account for all the carpet manufactured by a manufacturer, rather than only the quantity of carpet a manufacturer certifies. This change would align the standard more closely with one of the primary intents of AB 2398, which is to increase the amount of postconsumer carpet that is diverted from landfills, resulting in carpet manufacturers needing to reclaim or to demonstrate they have a financial or contractual instrument to reclaim more of the carpet they

manufacture. A manufacturer still would be required to have at least a 15 percent reclamation rate to obtain Platinum certification, but the calculation of this rate would reflect all of the manufacturer's carpet.

The proposed new formula:

*Reclamation Rate = pounds of all product reclaimed annually / pounds of total annual carpet production*

## **2.2 Recyclability**

Due to limited markets and lack of commercially viable recycling processes, it is not economically feasible to recycle some fibers used in the manufacture of carpet (e.g., polyethylene terephthalate, or PET, also referred to as polyester). The lack of recyclability calls into question the sustainability of the fiber. Additionally, some products that are added to carpet to achieve the standard's requirement for postconsumer content may not be readily recyclable (e.g., glass). The NSF 140 standard does not currently include requirements or optional credits for recyclability. Recyclability must be addressed in the standard in order to achieve the intent of AB 2398.

Therefore, we recommend:

Adding a new requirement, at the standard's Platinum level, that 100 percent of carpet is readily recyclable. Readily recyclable means that the carpet, regardless of the type of face fiber, when processed for recycling routinely results in no more than 10 percent of the carpet being disposed as residuals from the recycling process. Under this definition, carpet shall not be considered readily recyclable if more than 10 percent of the carpet is disposed as residuals from the recycling process.

## **2.3 Scope of the Standard**

The NSF 140 standard was originally developed as a standard for carpet sold in a commercial market. Management Memo MM 10-01, issued by DGS in 2009, requires that all carpet purchased for state-owned and -leased facilities be certified at the Platinum level of the 2007 version of the NSF 140 standard. While Management Memo MM 10-01 has not been revised, the state is currently requiring, through its specifications and lease agreements, that all carpet purchases for state-owned and -leased facilities be certified at the Platinum level of the 2012 version of the NSF 140 standard that was published in November 2012. There is a need to expand the scope of the standard to include a new section specifically for residential carpet to enable the state to purchase Platinum-certified residential carpet. Although the NSF 140 standard did not specifically exclude residential carpet, it is currently very difficult to procure NSF 140-2012 certified residential carpets. Due to the lack of sufficient market demand, manufacturers do not certify their residential carpet. However, some state facilities such as Department of Education dormitories; Department of Food and Agriculture housing for migrant farmworkers; and Cal Fire, California State Parks, and California Conservation Corps housing for employees serve a residential function and require the purchase of residential carpet. Incorporating residential carpet into the standard is critical to achieve the intent of AB 2398 because residential carpet constitutes approximately 70 percent of carpet sales in California and a significant percentage of the carpet landfilled in the state.

Therefore, we recommend:

Create two sections of the NSF 140 standard: one for commercial carpet and one new section for residential carpet. The current standard only adequately serves the commercial carpet market and should

be expanded to better serve the needs of the residential carpet market, which comprises seventy percent of carpet sales in California.

## **2.4 Life Cycle Assessment**

Life cycle impact assessment provides a science-based approach to evaluating reductions in environmental impacts and is the only tool that can evaluate carpet across all relevant environmental indicators. Currently, manufacturers can receive points for conducting a life cycle assessment under three criteria: (1) demonstrating a reduction of toxic chemicals and media pollutants per unit of carpet produced from 1986-1999, (2) demonstrating a reduction in at least six environmental life cycle impact categories (i.e. global warming, stratospheric ozone depletion, acidification, eutrophication, photochemical smog, human health, fossil fuel depletion, criteria air pollutants, ecological toxicity, and solid and hazardous waste) relative to a baseline no older than 2000, and (3) completing a life cycle assessment. Given the current point system structure, the standard allows for double-counting of points and relies on an outdated carpet industry baseline for purposes of evaluating the performance of specific products. Additionally, the criteria does not always take into consideration the actual results of the life cycle assessment, only that it was performed. Under the current standard, manufacturers are awarded points for conducting a life cycle assessment even if it shows the products they produce have high environmental impacts relative to the industry baseline. However, the NSF 140 standard has been in use for more than six years and there is sufficient information available to establish an updated carpet industry baseline and improve the standard's use of life cycle assessment to increase the sustainability of carpet.

Therefore, we recommend:

All points for life cycle assessment should be consolidated and awarded based upon evaluation of product-specific results relative to an updated industry baseline. The number of points awarded for reductions in life cycle impacts should be doubled in order to incentivize manufacturers to evaluate the cross-media impacts of the carpet they produce. For the Platinum level, the standard should require that the life cycle assessment demonstrate the carpet has reduced its environmental impact relative to the current carpet industry baseline.

## **2.5 Energy Inventory**

This standard recognizes the use of renewable energy, implementation of energy conservation, and energy efficiency measures. In the standard, there is currently double counting of points and redundant points awarded for energy efficiency, conducting an inventory of energy use by fuel type, and greenhouse gas emissions reporting. Manufacturers can receive up to 12 points for documenting increased energy efficiency and/or the use of renewable energy. However, these reductions are also recognized, implicitly or explicitly, in several other places within the standard that address reductions in greenhouse gas emissions and life cycle assessment. Manufacturers may also receive redundant points for providing an inventory of the energy use by fuel type, for calculating their greenhouse gas emissions, and for quantifying their greenhouse gas emission reductions. The result is that manufacturers are recognized more than once for the same activity.

Under the standard, the purchase of Renewable Energy Credits is given equal weight with onsite renewable energy generation. Equal weight should not be given to purchase of Renewable Energy Credits and onsite renewable energy generation. There is more environmental value from onsite renewable energy

generation than from procurement of grid-based renewable energy due to the avoidance of energy transmission which involves a complex network of transmission substations, transmission towers, power lines, and associated transmission losses and environmental impacts.

Therefore, we recommend:

The standard should credit manufacturers for reducing their energy consumption relative to the updated carpet industry baseline, for reporting their greenhouse gas emissions, and for reducing their greenhouse gas emissions. The standard should also be revised to incentivize the use of onsite renewable energy generation over the purchase of renewable energy credits.

## **2.6 Bio-Based and Recycled Content**

This standard focuses on the use of bio-based content, recycled content and other environmentally preferable materials. Currently, the standard gives equal credit to utilization of bio-based content and post-consumer recycled content. While in some cases a bio-based product may be a good environmental solution, it is not sufficient simply to have bio-based content. This is because bio-based products may or may not be compostable and have the potential to disrupt the downstream recycling of non-bio-based carpets. Additionally, there are agricultural, land-use, and social justice issues associated with some bio-based materials that should be considered. These issues include increasing demand for food crops as bio-based feedstocks, increases in food costs, environmental concerns associated with land use changes, and intensive agricultural practices used to meet the market demand for bio-based feedstocks.

The standard also provides credit for the use of coal fly ash as a post-industrial/pre-consumer content feedstock. Coal fly ash is a fine, powdery substance that is a byproduct of coal combustion. Coal fly ash is captured by air emission control equipment installed on coal-fired power plants and can be used in a variety of secondary applications such as cement production. Some of the multi-agency team members raised concerns about coal fly ash, which is mostly composed of silica, and potential respiratory health impacts associated with inhalation of this material in the form of particulate matter. Additional consideration of the potential for health impacts associated with processing carpet with high silica content for recycling is warranted prior to continuing to provide an incentive for the use of coal fly ash in the NSF 140 standard.

Therefore, we recommend:

The weighting factor of bio-based content should be lowered relative to the weighting factor of post-consumer recycled content. Additionally, granting credit for use of coal fly ash in the standard should be reconsidered as there is some concern regarding the potential for respiratory health impacts when carpet with high silica content is processed for recycling.

## **2.7 Public Health**

The NSF 140 standard relies on the Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers to address the testing, exposure modeling, and establishment of recommended limits for modeled indoor air concentrations of chemicals of concern. This Standard Practice was issued by the California Department of Public Health in 2004. However, in 2010 the California Department of Public Health issued a new version titled the Standard Method for the

Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, which supersedes the previous version of Standard Practice.

The NSF 140 standard should be updated to incorporate changes in the field of indoor air quality and utilize current health-based standards by adopting and referencing the new California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1. The Standard Method Version 1.1 issued in 2010 includes an informative residential scenario. If a new section for residential carpet is to be created in the NSF 140 Standard, this residential scenario should be used for exposure modeling when determining whether the product meets the standard.

One dilemma discussed by the multi-agency team, but not addressed in the California Department of Public Health Standard Practice, is the airborne emissions of the caprolactam monomer, which is used in the production of Nylon 6 carpet. The dilemma is that Nylon 6 (or polycaprolactam) constitutes one-third of the carpet sold in California and is the only carpet fiber that can truly be recycled for use in the manufacturing of new carpet. Nylon 6 is the most recycled and recyclable carpet face fiber and is the only fiber that is commercially de-polymerized into its basic monomer unit and subsequently blended with virgin monomer to produce the polymer for manufacturing new carpet (i.e., true closed-loop recycling). Despite these benefits, Nylon 6 is produced from the polymerization of the caprolactam monomer, and airborne emissions of caprolactam are a concern because exposure to caprolactam has been found to cause upper respiratory and eye irritation.

The Office of Environmental Health Hazard Assessment (OEHHA) has investigated caprolactam under California's Air Toxics "Hot Spots" program for assessing health risks from airborne emissions. In October 2013, OEHHA adopted a Chronic Reference Exposure Level for long-term exposure to caprolactam of 2.2 µg/m<sup>3</sup> (0.5 ppb). However, the OEHHA Chronic Reference Exposure Level for caprolactam has not been incorporated into Version 1.1 of the California Department of Public Health's Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers. Prior to including a health-based standard for caprolactam in the Department of Public Health's Standard Method, the Department of Public Health would conduct a feasibility assessment as part of its process to recommend an airborne emission limit. Absent the inclusion of a recommended airborne emission limit for caprolactam in the California Department of Public Health's Standard Method, the NSF 140 standard should be revised to include a Reference Exposure Level for caprolactam of 100 µg/m<sup>3</sup>. The 100 µg/m<sup>3</sup> recommended emission limit for caprolactam is currently utilized in Carpet and Rug Institute's Green Label Plus Program and represents a level of emission limit achievable by good industry practice.

Therefore, we recommend:

- I. The NSF 140-2012 standard should adopt and reference the new California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, published in February 2010.
- II. The standard should include a Reference Exposure Level of 100 µg/m<sup>3</sup> for caprolactam.

## 3. Consideration of Potential Impacts of Proposed Changes to the Standard

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The recommended changes to the NSF 140 standard were selected because they would further the intent of AB 2398 and improve the environmental sustainability of carpet purchased by the state. The recommendations were then evaluated by the multi-agency team based on a number of factors such as source reduction, recyclability, life cycle impacts, and economic or technological barriers to the proposed changes. After a thorough evaluation, the team determined that the recommendations would have a positive impact on encouraging source reduction, design for recyclability, and reducing the life cycle impacts of carpet.

### 3.1 Source Reduction

Source reduction is defined in California Public Resources Code Section 40196:

*“Source reduction” means any action which causes a net reduction in the generation of solid waste. “Source reduction” includes, but is not limited to, reducing the use of non-recyclable materials, replacing disposable materials and products with reusable materials and products, reducing packaging, reducing the amount of yard wastes generated, establishing garbage rate structures with incentives to reduce the amount of wastes that generators produce, and increasing the efficiency of the use of paper, cardboard, glass, metal, plastic, and other materials. “Source reduction” does not include steps taken after the material becomes solid waste or actions which would impact air or water resources in lieu of land, including, but not limited to, transformation.*

Source reduction is at the top of the waste management hierarchy (reduce, reuse, recycle, environmentally sound landfilling, and transformation) because of the significant economic and environmental benefits that are realized when waste is reduced at its source, as compared to controlling and managing waste after its creation. The NSF 140 standard is structured to drive innovations in source reduction through dematerialization (i.e., reducing the weight of carpet) and reducing the use of non-recyclable materials used to manufacture carpet. The following three recommended changes would have a direct impact on source reduction:

1. Require that all carpet is 100 percent readily recyclable. This is a key attribute of sustainably produced carpet. Such a requirement would result in additional source reduction by reducing the use of non-recyclable materials in the manufacturing of carpet;
2. Expand the scope of the standard to include residential carpets. This would broaden the reach of the standard and ensure that source reduction is rewarded when purchasing both commercial and residential carpets for state-owned and -leased facilities;
3. Require a reduction in the life cycle environmental impacts of Platinum-certified carpet. This would drive additional source reduction, because it is one of the primary means for a manufacturer to reduce the life cycle environmental impacts of carpet.

### **3.2 Recyclability**

Many of the barriers to recycling stem from the fact that products are often not designed with recyclability as a consideration. Consequently, products are frequently introduced into the market that are technically or economically challenging to recycle. Product design is the first step in a successful and effective recycling system. The following four recommended changes to the standard would encourage carpet manufacturers to take recyclability into consideration during the product design phase, thereby increasing the recyclability of carpet:

1. Change the reclamation formula. This would result in the need for increased reclamation and create an incentive for carpet manufacturers to ensure it is economically viable to recycle their carpet.
2. Require 100 percent recyclability of Platinum-certified carpet
3. Create a new section in the standard for residential carpet. Residential carpet, which accounts for 70 percent of carpet sales in California, is not currently covered by the standard. This proposed change would increase the recyclability of residential carpet.
4. Require reductions in life cycle-based environmental impacts. This would lead to reduced environmental impacts and greater recyclability, because recycling carpet is the end-of-life management option with the lowest environmental impact.

### **3.3 Life Cycle Impacts**

Manufacturers can optimize the environmental performance of their products by systematically assessing and taking subsequent action to reduce the impacts at each stage of a product's life cycle. The following seven recommended changes would result in a reduction in the life cycle impacts of Platinum-certified carpet.

1. Change the reclamation formula. This would necessitate that manufacturers increase the reclamation rate of their carpet for the purposes of recycling.
2. Recycling is the end of life management option with the least environmental impacts. Increased carpet reclamation will result in a reduction in life cycle impacts;
3. Require 100 percent recyclability of platinum-certified carpet. This would enable a higher percentage of Platinum-certified carpet to be recycled and result in a reduction in life cycle impacts, because recycling is the environmentally preferred end-of-life management option;
4. Create a new section in the standard for residential carpet. This would reduce life cycle impacts, because residential carpet, which accounts for 70 percent of carpet sales in California, is not currently covered by the standard.
5. Require a reduction in the life cycle environmental impacts of Platinum-certified carpet;
6. Credit manufacturers who utilize onsite renewable energy generation, reduce energy consumption, and reduce greenhouse gas emissions. This would reduce the use of non-renewable energy and reduce the emissions of greenhouse gases from the manufacturing of Platinum-certified carpet, resulting in reduced life cycle impacts.
7. Adopt and reference the Version 1.1 of the California Department of Public Health's Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers. This would reduce life cycle impacts by ensuring that the testing, exposure modeling, and allowable limits for modeled indoor air concentrations used

in the standard incorporate changes in the field of indoor air quality and utilize current health-based standards.

8. Incorporate a reference exposure level for caprolactam in the standard. This would reduce life-cycle impacts by ensuring that the use of Platinum-certified carpet does not compromise indoor air quality by exposing building occupants to airborne concentrations of caprolactam that could result in adverse health impacts. The Office of Environmental Health Hazard Assessment adopted a Chronic Reference Exposure Level for Caprolactam in October 2013, but it was not incorporated in Version 1.1 of the California Department of Public Health's Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers. Therefore, a reference exposure level for caprolactam is needed in the standard.

### **3.4 Economic and Technological Barriers to Proposed Changes**

Each of the recommended changes was analyzed and economic or technical barriers to the proposed changes were carefully considered by the multi-agency team. The multi-agency team concluded that if incorporated into the NSF 140 standard, the proposed changes would not result in unreasonable technical or economic barriers that would prevent sustainably produced carpet from obtaining Platinum certification. In fact, many of the sustainably produced carpets currently certified at the Platinum level already comply with most of the proposed changes. However, the proposed changes would incrementally raise the bar, in particular by requiring increased reclamation to obtain Platinum certification. The proposed changes would help ensure that only sustainably produced carpets obtain Platinum certification.

Listed below are the key findings and recommendations from the analysis of the economic and technical barriers to the proposed changes:

1. Change the standard's formula for reclamation. This would require carpet manufacturers to reclaim more of their carpet in order to obtain Platinum certification. This proposed change will require some manufacturers to invest more money in reclaiming carpet. However, the reclamation of carpet for purposes of recycling is one of the primary intents of AB 2398, and this proposed change does not create an unreasonable economic barrier, as some carpet manufacturers already reclaim a significant quantity of their carpet.
2. Ensure that all carpet at the Platinum certification level is 100 percent recyclable. This will pose technical and economic barriers for carpets made with non-nylon face fibers such as polyethylene terephthalate (PET), which is not currently 100 percent recyclable. There are limited markets for recycled PET face fiber and the markets that do exist, such as carpet backing, tend to be low-value markets where the commodity prices paid for the PET do not cover the collection and processing costs associated with recycling. This proposed change will create an incentive to overcome the current technical and economic barriers for carpet that is not 100 percent recyclable. There are no technical or economic barriers with this proposed change for nylon carpet due to strong commodity value and existing market demand for recycled nylon.
3. Request a new residential carpet standard, or modify existing standards to include residential carpet. This proposed change may be viewed as economically or technically burdensome to some residential carpet manufacturers as it would prohibit sales of residential carpet to some purchasers, such as the State of California, unless the carpet had a Platinum certification. However, the specific requirements of the new residential carpet standard will be developed

through the NSF consensus-based public process with a multi-stakeholder group of participants. This will ensure that the new residential standard provides a market-based definition and path to more sustainable residential carpet without erecting unreasonable economic or technical barriers.

4. Require a reduction in the life cycle environmental impacts of carpet, which may pose economic barriers if a manufacturer needs to invest in research and development, design changes, or other capital investments in order to reduce the life cycle environmental impacts of its carpet relative to the industry baseline. Utilizing the NSF consensus process would allow for careful consideration of the economic and technical barriers to reducing the life cycle impacts of carpet production and ensure that the size of the reduction in environmental impacts required for Platinum certification would not create unreasonable technical or economic barriers that would limit availability of Platinum-certified carpet.
5. Utilize onsite renewable energy generation. Reducing energy consumption and reducing greenhouse gas emissions may require new capital investments to produce renewable energy on-site or to reduce energy consumption or greenhouse gas emissions. However, this recommendation would not create an economic barrier as it is not a prerequisite and manufacturers have the flexibility to earn the points needed to achieve Platinum certification in any of the five credit categories if this proposed change proves too expensive. Additionally, while complying with this proposed change may require an initial expenditure, that expenditure would be offset via long-term reductions in operating costs.
6. Lower the weighting factor for bio-based content relative to post-consumer content. This would not create an economic or technical barrier as Platinum-certified carpets with post-consumer content are readily available.
7. Adopt and reference the Version 1.1 of the California Department of Public Health's Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers. This would not create an economic or technical barrier because Version 1.1 is already used extensively by a number of other standards such as the California Green Building Standards Code and the United States Green Building Council's Leadership in Energy and Environmental Design Rating System.
8. Incorporate a reference exposure level for caprolactam into the standard. A health-based standard for caprolactam is not currently incorporated into Version 1.1 of California Department of Public Health's Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers; this addition would result in an incremental increase in laboratory testing expenses. However, this proposed change would not create a significant economic or technical barrier, because carpets are already tested for caprolactam emissions under the Carpet and Rug Institute's Green Label Plus Program.

## 4. Options for the Legislature

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To implement the recommendations, CalRecycle and DGS believe consideration should be given to the following three legislative options:

1. Direct CalRecycle and DGS to work through the NSF International standards revision process to recommend incorporation of the recommendations listed above into the next update of the NSF 140 standard and to reference the standard in the State Contracting Manual, the State Administration Manual and in Buying Green: California's Guide for Sustainable Purchasing. The NSF 140/ANSI committee has a consensus process for recommendations and approval of

revisions to the standard, and would require a consensus for approval. While CalRecycle and DGS could pursue this option administratively, being directed to do so by the Legislature would further indicate California's priority to have revisions made to those involved in making decisions about the standard.

2. If these recommendations have not been approved by the NSF 140 Standard Committee by January 1, 2015, to be incorporated into the next update of the NSF 140 standard, CalRecycle and DGS recommend that the Legislature direct DGS to include any of these recommendations as possible and feasible in the state's specifications for purchasing carpets for state-owned and -leased facilities (DGS lease agreements currently require that carpet be certified to the NSF 140 standard at its Platinum level). Additionally, the NSF 140 standard should be referenced by DGS in the State Contracting Manual, the State Administration Manual and in Buying Green: California's Guide for Sustainable Purchasing.
3. Direct DGS and CalRecycle to pursue option one and to incorporate these recommendations, or a subset of them, into the state's carpet-purchasing specifications, the State Contracting Manual, the State Administrative Manual and Buying Green: California's Guide for Sustainable Purchasing, by January 1, 2015.

CalRecycle and DGS recommend the first option as the preferred initial approach because incorporating these recommendations into the NSF 140 standard would ensure that the recommendations would impact all carpet certified to the NSF 140 standard, not just carpet purchased by the State of California. Additionally, the California Green Building Standard Code and the Collaborative for High Performance Schools encourage the use of the NSF 140 standard for procurement of carpets. Consequently, incorporating these recommendations into the NSF 140 standard through the NSF International standards revision process will have a greater impact in realizing the intent of AB 2398 than simply applying these recommendations to carpet purchases made by the State of California. However, if CalRecycle and DGS are not successful in getting these recommendations incorporated into the NSF 140 Standard by January 1, 2015, then CalRecycle and DGS recommend the second option as the subsequent action.

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