Introduction and Purpose

About us:

CanAmerica PHMGH Inc 2021 is a Canadian company working to become the leaders in the global of polyhexamethylene guanidine hydrochloride (PHMGH) market. PHMGH has been identified as a useful polymer for its sterilization and disinfecting properties, but problems with stability and toxicity have contributed to the widespread adoption of PHMGH.

Skillful research and development on PHMGH for almost a decade has resulted in CanAmerica developing innovations that now enables the company to provide a low cost, effective and safe PHMGH product called StampOut™.

This document is intended to provide some compelling data to the decision makers at Hamad International Airport (HIA) regarding adding StampOut™ to your facilities management program. **StampOut™ is sold exclusively through Go-Trade E-Commerce**.

CanAmerica is proposing a scenario wherein HIA adds using StampOut™ to the cleaning routine and reduces use of two products - **Urea HCl cleaner** and **Abrasive cleaner**. CanAmercia has built a case study around an optimized scenario of using all three products to maximize the cost and environmental advantages of StampOut™ so that HIA experiences the following benefits:

- Reduction of more expensive and harsher abrasive cleaners;
- Preservation of airport surfaces;
- Reduced Environmental Impact;
- Reduced costs from product **and** labor; and
- Realization of even higher hygiene and visual cleanliness outcomes.

(Please note that while StampOut™ is a biocide and virucide, currently it is only approved by the Canadian government as a general cleaner. Therefore, CanAmerica is only building this optimized model where StampOut™ augments general cleaners but does not displace products which are certified disinfectants).

Business Case for Integrating StampOut™

Business Case: Optimized Restroom Cleaning Strategy – Hamad International Airport (HIA)

Objective:

Present a scenario using StampOut™ to Hamad International Airport which outlines a cost-effective, high-impact restroom cleaning strategy that improves hygiene, reduces labor, and aligns with HIA's sustainability and safety goals.

The 3 Products in the Blended Strategy:

StampOut™

- Daily application (2x/day)
- Broad-spectrum antimicrobial action
- Cost: $0.75/L | Annual usage: 768,325 L | Cost: ~$576K

Urea Hydrochloride Cleaner

- Weekly descaling (2x/week)
- Effective against mineral and uric acid buildup
- Cost: $7.65/L | Annual usage: 109,460 L | Cost: ~$837K

Abrasive Cleaner

- Monthly scrubbing (targeted at 20% of area)
- For stubborn stains and grout
- Cost: $5.00/L | Annual usage: 2,526 L | Cost: ~$12.6K

Proposed Model

Below is a model outlining how and where all three products are used to clean bathrooms which maximizes each of their respective strengths.

The model is premised on an **optimized 3-tier cleaning scenario** using:

1. **PHMGH disinfectant** for daily general surface cleaning
2. **Urea HCl cleaner** for weekly descaling (targeted deep cleaning)
3. **Abrasive cleaner** for heavy-duty scrubbing on a limited schedule (e.g., monthly or biweekly)

The benefits to this plan for HIA are to:

- Minimize overuse of the **expensive and harsh abrasive cleaner**
- Preserve surfaces
- Keep costs and labor time efficient
- Maintain high hygiene and visual cleanliness standards
- Reduce Environmental Impacts

Building the Model

The following approach is used to build the model:

Define use frequencies

Task	**Product**	**Frequency**	**Area Treated**
Daily disinfection	PHMGH	2x daily	All restroom zones
Weekly descaling	Urea HCl Cleaner	2x per week	Fixtures + walls
Heavy-duty scrubbing (stains)	Abrasive Cleaner	1x per month	20% of restroom area

Calculate the annual chemical usage and cost based on:

- 42,100 m² restroom area at HIA
- 40 m²/L efficiency
- Costs:

- PHMGH = **$0.75/L**
- Urea HCl Cleaner = **$7.65/L**
- Abrasive Cleaner = **$5.00/L**

Outcomes from the Model

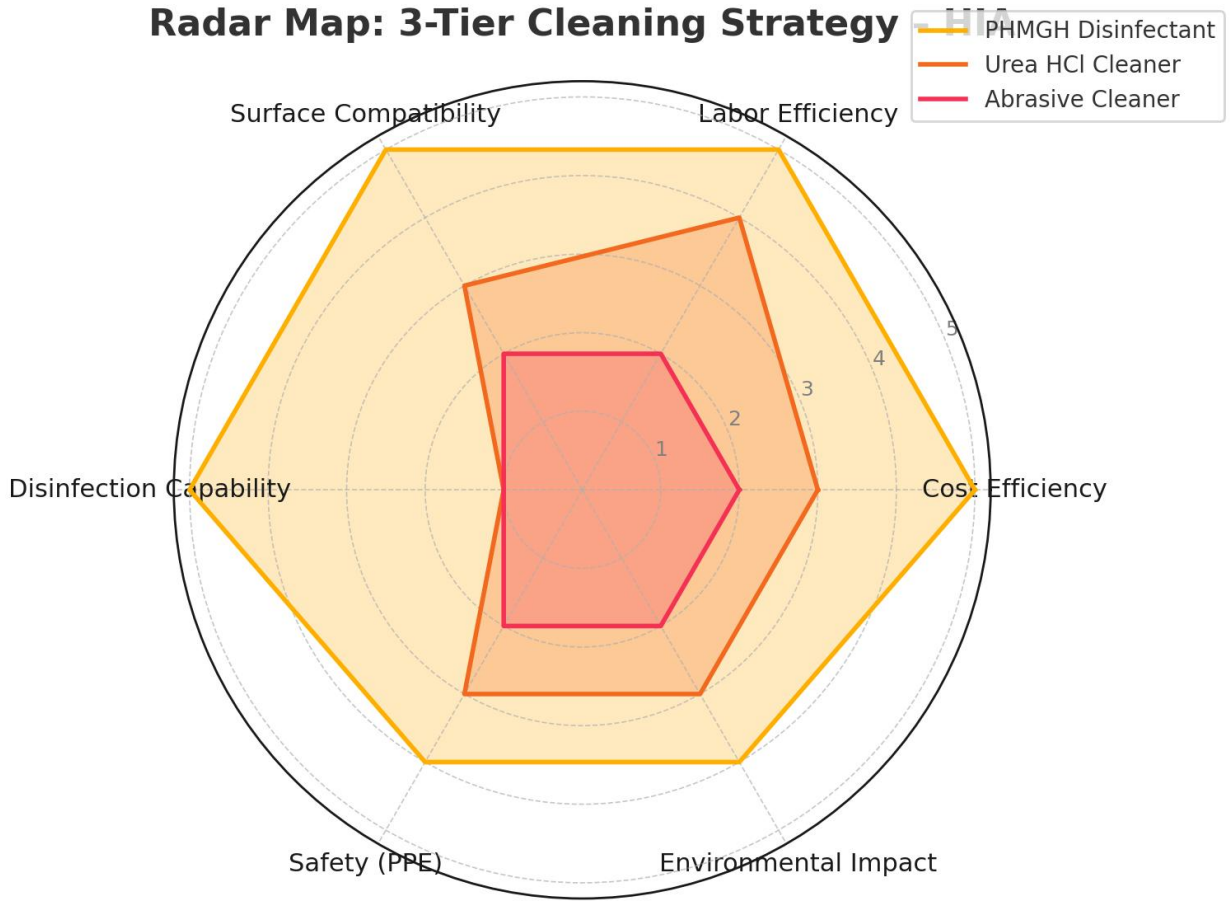
Below is the CanAmerica proposed optimized 3-product blended cleaning scenario for restrooms at Hamad International Airport:

Annual Chemical Usage & Cost Summary

Product	Annual Volume (L)	Cost per Liter	Annual Cost (USD)
PHMGH Disinfectant	768,325 L	$0.75	$576,243.75
Urea HCl Cleaner	109,460 L	$7.65	$837,369.00
Abrasive Cleaner	2,526 L	$5.00	$12,630.00
Total Blended Cost	—	—	**$1,426,243**

Benefits from the Model

Radar Map: 3-Tier Cleaning Strategy – HIA



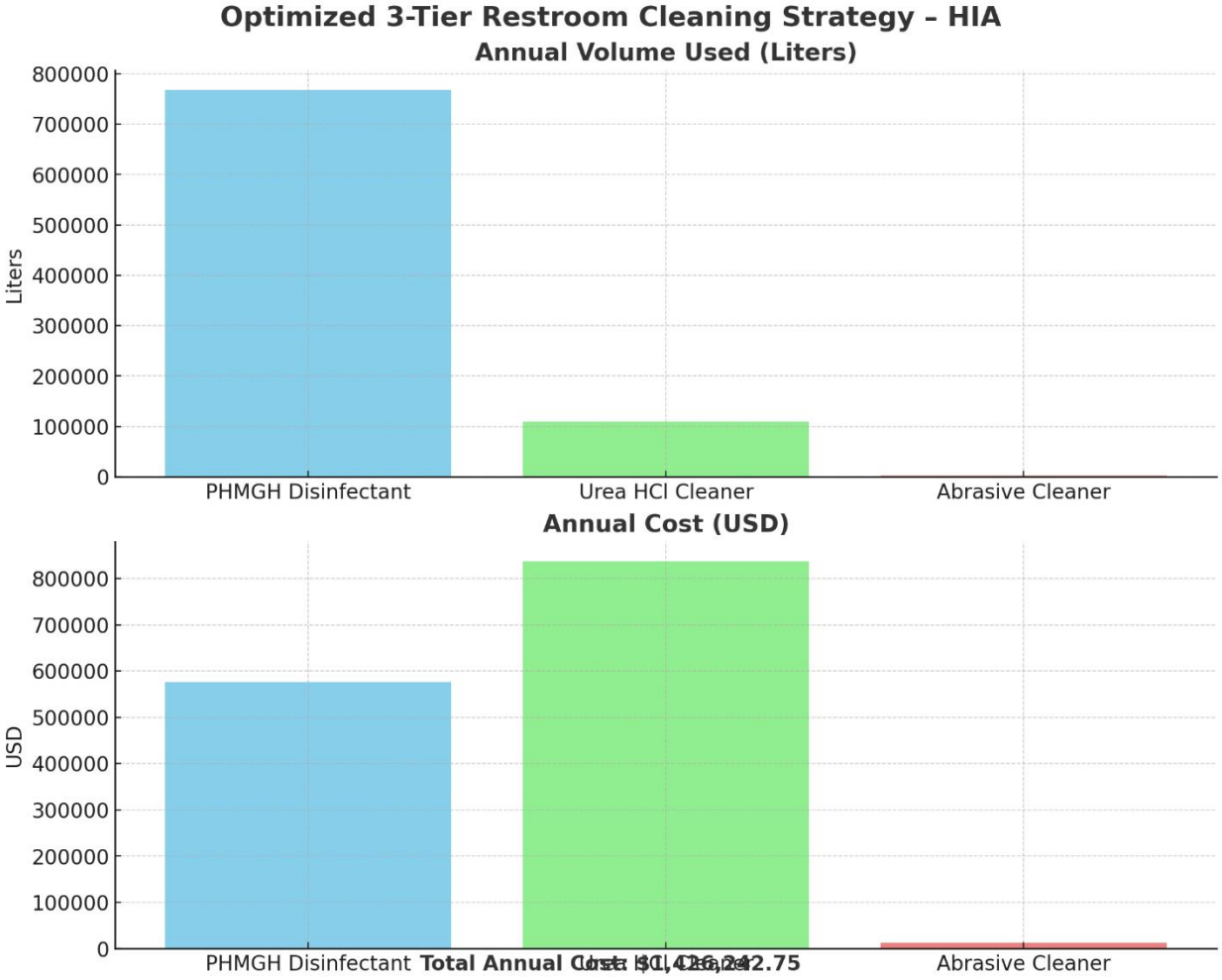
The **radar chart** for the **3-tier cleaning strategy** at HIA illustrates:

- **PHMGH** leads in disinfection, cost, labor efficiency, safety, and minimized environmental impact. Clearly illustrating why it should be used most frequent.
- **Urea HCl Cleaner** scores well for deep cleaning and targeted use.
- **Abrasive Cleaner** is specialized—lower overall scores but valuable in small, specific zones.

This visual makes a strong case for why each product has its place and how they complement each other strategically.

A different **visual infographic** summarizing the optimized 3-product cleaning strategy for HIA restrooms shows the following information:

- **Top chart** shows annual **volume of each product used**
- **Bottom chart** shows annual **cost breakdown**
- PHMGH dominates in volume but remains cost-efficient, reducing ~650,000 litres per year of the more expensive HCl Cleaner and saving HIA ~$5M annually with the application of less expensive StampOut™.
- The use of the Abrasive cleaner remains, but less frequently given its benefits of deep-cleaning.


Optimized 3-Tier Restroom Cleaning Strategy – HIA
Annual Volume Used (Liters)
Liters
800000
700000
600000
500000
400000
300000
200000
100000
0
PHMGH Disinfectant
Urea HCl Cleaner
Abrasive Cleaner
Annual Cost (USD)
USD
800000
700000
600000
500000
400000
300000
200000
100000
0
PHMGH Disinfectant
Abrasive Cleaner

Key Insights and Takeaways

- **PHMGH** remains the dominant component by volume and is cost-efficient for daily disinfection.
- **Urea HCl** carries the highest cost but is used less frequently—targeted for mineral buildup and deep cleaning.
- **Abrasive Cleaner** is applied selectively (~20% of surfaces, monthly), keeping its cost impact **under 1% of total** while still delivering high-value cleaning power where needed.
- **This model reduces the annual cost of Urea HCl cleaner from $5,880,686 to about $837,369. It adds $575,000 of StampOut™ costs. The financial impact being a cost savings of almost $5M annually**.

Summary of Three Product Business Case

Presentation Briefing: Optimized Restroom Cleaning Strategy for Hamad International Airport (HIA)

Executive Summary

The proposal outlines a strategic, cost-efficient, and environmentally conscious cleaning protocol for restrooms at Hamad International Airport (HIA), using a blended chemical approach. It demonstrates measurable savings, safety improvements, and operational benefits over traditional cleaning regimens.

Objective

To enhance restroom hygiene standards while optimizing:

- Total cost of ownership (TCO)
- Labor and safety risk
- Environmental sustainability

Proposed Blended Chemical Strategy

Task	Product	Frequency	Purpose
General surface disinfection	PHMGH Disinfectant (RTU)	2x daily	Broad-spectrum antimicrobial action
Descaling and deep cleaning	Urea Hydrochloride Restroom Cleaner	2x per week	Scale, grime, and uric acid removal

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Cost Model *(Annualized)*

Metric	PHMGH Disinfectant	Urea HCl Cleaner	Total Blended Strategy
Usage (liters/year)	768,325 L	109,512 L	~877,837 L
Unit Cost	$0.75/L	$7.65/L	
Annual Chemical Cost	$576,244	$838,075	**$1,414,319**

Operational Impact

- **Labor Hours:** Reduced by 20% using PHMGH's residual antimicrobial effect
- **Safety:** Lower chemical exposure and corrosion risk in routine tasks
- **Training:** Specialized handling required only for Urea HCl deep clean

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Sustainability & Compliance

- PHMGH and Urea HCl both meet international biodegradability benchmarks
- No volatile organic compounds (VOCs)
- Low aquatic toxicity risk
- GHS compliance and safe transport (non-flammable)

Visual Dashboard Summary *(See accompanying radar chart)*

Evaluation Dimension	PHMGH	Urea Cleaner
Cost Efficiency	⭐ ⭐ ⭐ ⭐ ⭐	⭐ ⭐ ⭐
Volume Efficiency	⭐ ⭐	⭐ ⭐ ⭐ ⭐
Labor Optimization	⭐ ⭐ ⭐ ⭐	⭐ ⭐
PPE/Safety Profile	⭐ ⭐ ⭐ ⭐	⭐ ⭐
Sustainability	⭐ ⭐ ⭐ ⭐	⭐ ⭐ ⭐
Material Compatibility	⭐ ⭐ ⭐ ⭐	⭐ ⭐ ⭐

Strategic Recommendation

Adopt a dual-product protocol to:

- Improve cleaning and disinfection effectiveness
- Lower chemical and labor costs per square meter
- Align with HIA's goals for innovation, hygiene leadership, and sustainability

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Next Steps

- Pilot rollout in selected terminals (A/B)
- Measure chemical usage, time savings, and user satisfaction
- Evaluate for full-scale procurement

Prepared by CanAmerica for HIA Facilities & Procurement Teams using best available data

Appendix A – Blending use of PHMGH and Urea Hydrochloride Bathroom Cleaner

Below is the data used to model a cost comparison between **the urea hydrochloride-based restroom cleaner** and the **PHMGH-**based disinfectant for use in the restrooms of Hamad International Airport (HIA) in Qatar.

Assumptions:

Volume needed:

- Assuming restrooms constitute 5% of the total terminal area, and since HIA's terminal spans approximately 842,000 square meters, we assume restroom area ≈ 42,100 square meters.
- Assume for cleaning frequency HIA does twice daily cleaning.
- Application Efficiency – each product can clean 40 square meters per liter.

Product Costs:

- Restroom Cleaner: Approximately $7.65 per liter (based on previous estimates).
- PHMGH Disinfectant: $0.75 per liter (ready-to-use).

Calculations for Cleaning Requirements:

- Total Area Cleaned Daily: 42,100 m² × 2 = 84,200 m².
- Cleaner Needed per Day: 84,200 m² ÷ 40 m²/L = 2,105 liters.
- Total Liters per Year: 2,105 L/day × 365 days = 768,325 liters.

Annual Costs:

- Restroom Cleaner: 768,325 L × $7.65/L = $5,880,686.
- PHMGH Disinfectant: 768,325 L × $0.75/L = $576,244.

Considerations:

Functionality:

- The urea hydrochloride-based restroom cleaner is primarily designed for cleaning and descaling; it does not possess disinfectant properties.
- The PHMGH-based disinfectant offers antimicrobial action, providing both cleaning and disinfection. – although we are not approved as a disinfectant, however this would be an additional benefit.

Operational Implications:

- If disinfection is a priority (e.g., for hygiene standards in an international airport), the PHMGH disinfectant may be more suitable.
- However, for tasks like mineral scale removal, the urea hydrochloride cleaner would be necessary.

Cost Efficiency:

- Despite the higher per-liter cost of the restroom cleaner, its specialized function may justify its use in specific scenarios.
- For general cleaning (with disinfection as an added bonus), the PHMGH disinfectant offers a more cost-effective solution.

Recommendation:

A combined approach might be optimal:

- Use the urea hydrochloride-based cleaner periodically for descaling and deep cleaning.
- Employ the PHMGH disinfectant for daily cleaning routines to maintain hygiene standards cost-effectively.
- This strategy balances cost efficiency with functional effectiveness, ensuring both cleanliness and sanitation in HIA's restrooms.

Simulated Outcome Justifying the Business Case for Using StampOut™ in Bathrooms along with the other cleaner

Below the scenario is expanded into a **strategic facilities cleaning plan** for an airport like Hamad International (HIA), using a **blended chemical approach** and layering in **operational, environmental, and cost dimensions**.

Strategic Cleaning Model: HIA Restroom Zones

Blended Product Strategy

Function	Product	Frequency	Justification
Daily Disinfection	PHMGH-based disinfectant ($0.75/L RTU)	1x–2x daily	Kills pathogens; safer for users; lower material wear
Descaling/Deep Clean	Urea Hydrochloride Restroom Cleaner ($7.65/L)	2x/week	Removes hard water deposits, soap scum, grime
Spot Odor Control (Optional)	Fragranced neutralizers	As needed	Improves passenger experience in high-traffic restrooms

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Annual Consumption & Cost Model

Using previous assumption: **42,100 m² restroom area**, 2x/day coverage, 40 m²/L efficiency.

Metric	PHMGH	Urea HCl Cleaner
Usage per application	1,053 L	1,053 L
Applications/year	730	104

Metric	PHMGH	Urea HCl Cleaner
Liters/year	768,325	109,512
Cost/L	$0.75	$7.65
Annual Chemical Cost	**$576,244**	**$838,075**

Blended Total: ~$1.41M/year for a dual-function strategy.

♀ Labor & Handling Efficiency

Factor	PHMGH	Urea HCl
PPE Required	Moderate (gloves, goggles)	High (acidic—full PPE)
Corrosion Risk	Low	Moderate (to metal, tile grout)
Reapplication Needs	Less frequent due to residual effect	Spot use, not daily
Training Needs	Low–moderate	High – chemical burn potential

Operational Efficiency Tip: Allocate PHMGH to janitorial generalists, reserve urea-based cleaning for trained staff on scheduled deep cleans.

Environmental & ESG Layer

Impact Area	PHMGH	Urea HCl
Biodegradability	Generally high	High (especially surfactant/APG mix)
Aquatic Toxicity	Low–moderate	Low
VOC Emissions	Very low	Very low
Sustainability Notes	Long shelf-life, reduces overuse	Mild acid alternative to HCl

Eco-Scoring (Indicative):

- **PHMGH:**
- **Urea Restroom Cleaner:**

Protocol Optimization (Advanced)

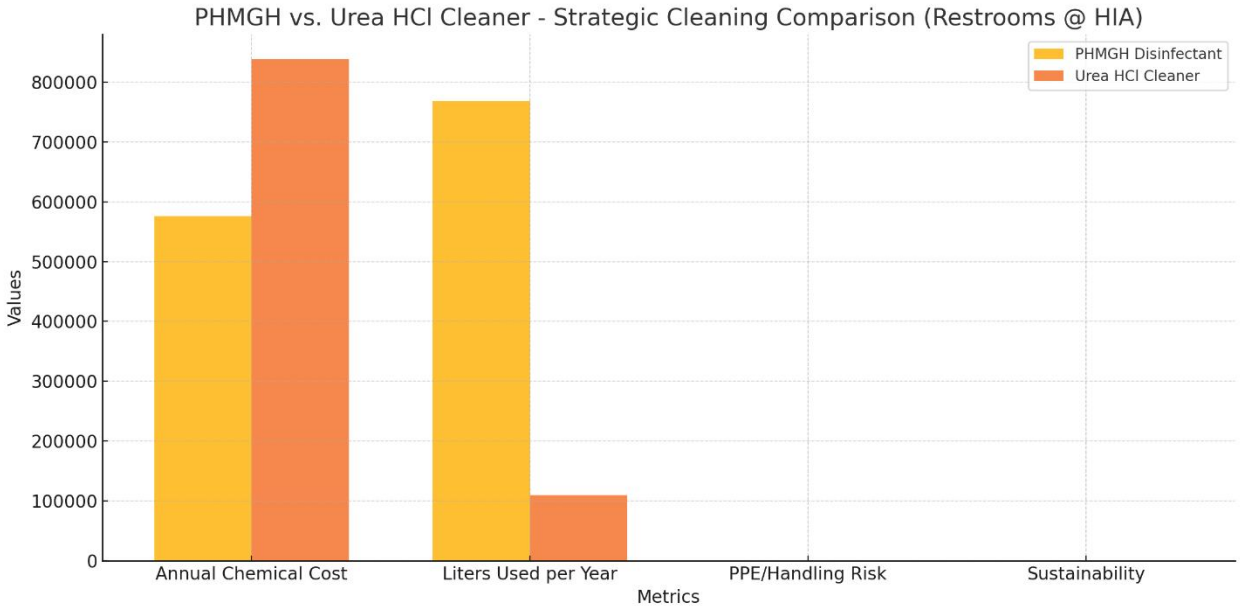
Cleaning Task	Frequency	Product	Labor Implication
Daily wipe-down (mirrors, counters, doors)	2x/day	PHMGH	Fast; light touch
Floor mopping (high-traffic)	2x/day	PHMGH	Fogger or mop
Toilets/urinals descaling	2x/week	Urea Cleaner	Requires manual scrub
Deep clean (walls, grout, drains)	1x/month	Urea Cleaner + PHMGH rinse	Team-based

Below is a visual summary comparing **PHMGH disinfectant** and **Urea Hydrochloride restroom cleaner** for Hamad International Airport:

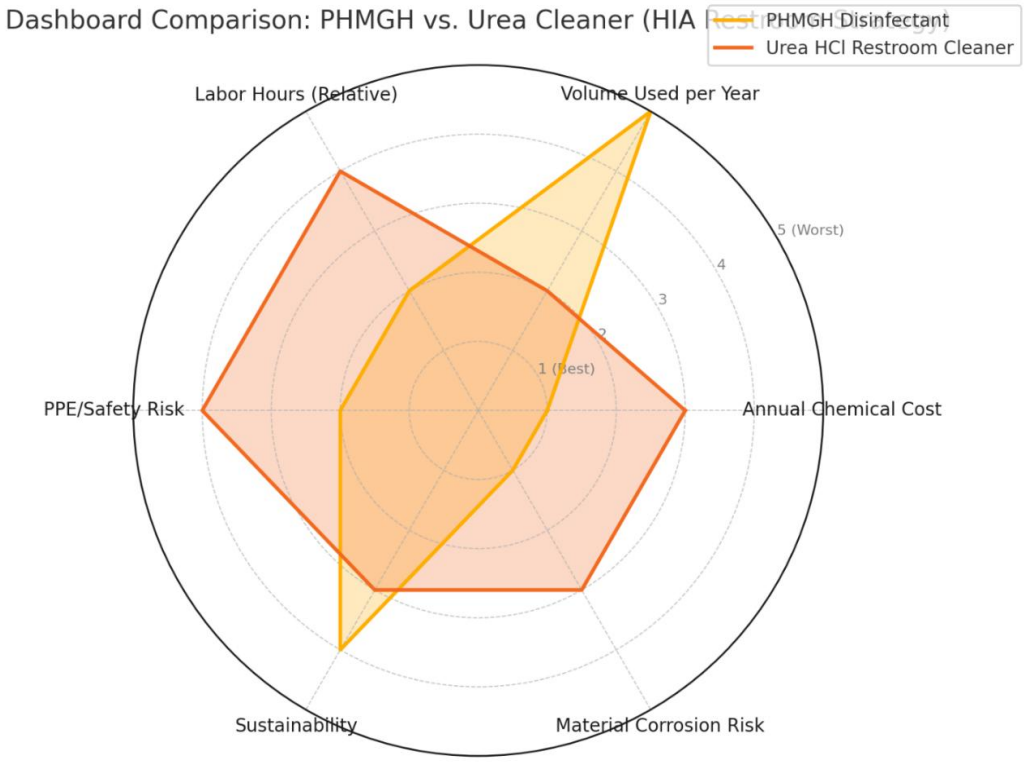
- **Cost:** PHMGH is significantly more cost-effective annually.
- **Volume:** PHMGH is used in greater quantity due to daily application; Urea is more targeted.
- **PPE/Handling Risk:** Urea has higher handling complexity due to its acidity.
- **Sustainability Score:** Both perform well, but PHMGH has a slight edge due to its safer profile and longer-lasting efficacy.

The approach will also contribute to HIAs ESG commitments since StampOutTM is environmentally neutral and degradable.

PHMGH vs. Urea HCl Cleaner - Strategic Cleaning Comparison (Restrooms @ HIA)



Dashboard Comparison: PHMGH vs. Urea Cleaner (HIA Restroom Strategy)



Interpretation:

PHMGH Disinfectant scores better in:

- Annual cost
- PPE/safety
- Material compatibility
- Sustainability

Urea HCl Cleaner is more effective for targeted use (low volume) but:

- Requires more labor (scrubbing, dwell time)
- Has higher corrosivity and safety handling needs

Strategic Takeaway:

Use **PHMGH** for *routine, scalable disinfection* and **Urea-based cleaner** for *specialized deep-cleaning tasks*. This pairing keeps cost and risk low while maintaining high cleaning efficacy.

Appendix B – Blending use of PHMGH and Abrasive Cleaning Product

Below is the data used to model a cost comparison between **the Abrasive Cleaning Product** (which is not a disinfectant) and the **PHMGH-**based disinfectant for use in the restrooms of Hamad International Airport (HIA) in Qatar.

Assumptions:

1. **Restroom Area:**
    - Total restroom area: **42,100 square meters**.
2. **Cleaning Frequency:**
    - **Twice daily** cleaning. Walmart.com+6Ebright Chem+6Irobiocide+6
3. **Application Efficiency:**
    - **40 square meters per liter** for both products.
4. **Product Costs:**
    - **PHMGH Disinfectant:** Previously estimated at **$0.75 per liter**. Speciality Chemicals
    - **Abrasive Cleaner:** Based on available data, estimated at **$5.00 per liter**.

Calculations:

1. **Daily Cleaning Requirements:**
    - **Total Area Cleaned Daily:** 42,100 m² × 2 = **84,200 m²**. PMC
    - **Cleaner Needed per Day:** 84,200 m² ÷ 40 m²/L = **2,105 liters**.
2. **Annual Consumption:**

- **Total Liters per Year:** 2,105 L/day × 365 days = **768,325 liters**.

3. **Annual Costs:**
    - **PHMGH Disinfectant:** 768,325 L × $0.75/L = **$576,244**.
    - **Abrasive Cleaner:** 768,325 L × $5.00/L = **$3,841,625**.

Summary:

- **PHMGH Disinfectant Annual Cost:** Approximately **$576,244**.
- **Abrasive Cleaner Annual Cost:** Approximately **$3,841,625**.

Considerations:

- **Functionality:**
    - The **PHMGH disinfectant** offers **antimicrobial action**, providing both cleaning and disinfection.
    - The **abrasive cleaner** is designed for **mechanical soil removal** and may not possess disinfectant properties.
- **Operational Implications:**
    - The abrasive nature of the cleaner may necessitate **additional labor** due to manual scrubbing.
    - Potential for **surface wear** over time with frequent use of abrasive cleaners.
- **Cost Efficiency:**
    - The **PHMGH disinfectant** is significantly more **cost-effective** for daily cleaning routines.
    - The **abrasive cleaner** could be reserved for **periodic deep cleaning** to manage costs and minimize surface wear.

Recommendation:

Implement a **blended cleaning strategy**:

- **Daily Cleaning:** Utilize the **PHMGH disinfectant** for routine cleaning and disinfection, optimizing both cost and hygiene.
- **Periodic Deep Cleaning:** Employ the **abrasive cleaner** on a **weekly or bi-weekly basis** for areas requiring intensive soil removal.

This approach balances **cost efficiency**, **cleaning efficacy**, and **surface preservation**, ensuring a high standard of cleanliness in HIA's restrooms.