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# How social norm feedback can reduce unsorted waste and increase recycling in the residential sector

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<sup>1</sup> The full article that this brief is based on is published as *Open Access* in Journal of Public Economics. It can be accessed and downloaded here: <https://doi.org/10.1016/j.jpubeco.2024.105191>

### **Summary**

*The EU waste legislation requires member states to prepare 55% of municipal waste for re-use and recycling, to recycle 65% of all packaging waste by 2025, and to limit landfilling municipal waste to 10% by 2035. A large majority of the member states are at risk of missing one or more of these targets. Thus, there is a need to identify additional policies beyond command-and-control and market-based instruments that can effectively contribute to these targets. This policy brief describes one such policy: social norms feedback. This has been trialled with nearly 20,000 households in Sweden that faced Pay-as-you-throw schemes. In this setting, the unsorted waste fraction was reduced by around 10% and three quarters of that was due to increased recycling. The large trial sample and wide-ranging socio-economic characteristics suggests that 10-20% reduction of unsorted waste can be expected in jurisdictions with flat tariffs. If local governments collaborate and share the cost of waste truck equipment, then the policy is likely to generate a substantial economic surplus.*

## **1. Introduction**

Increasing waste levels and low rates of recycling/reuse have quickly become serious environmental problems. The EU waste legislation requires member states to prepare 55% of municipal waste for re-use and recycling, to recycle 65% of all packaging waste by 2025, and to limit landfilling municipal waste to 10% by 2035. To reach these targets, policy makers have recently implemented interventions that increase the cognitive cost of waste disposal, improve waste infrastructure capacity, provide more relevant information to consumers, establish marketplaces for used products, impose legal restrictions on non-recycled products, develop educational programs, and increase the landfill and incineration taxes.<sup>2</sup> However, despite all these efforts, a large majority of the member states are at risk of missing one or more of the targets.

This policy brief is a summary of a study that investigates how social norm feedback can influence household waste behaviour. The study we refer to implemented two field experiments with nearly 20,000 Swedish households. These households represent a wide range of socio-economic characteristics. Thus, results are likely transferable to many developed countries with a reasonable level of environmental awareness and trust in institutions. The research offers the first evidence that personalized waste feedback, similar to the information included on electricity and water invoices where the household's own consumption is compared to an average household,<sup>3</sup> can reduce unsorted household waste. The findings underscore the potential of behavioural nudges as a cost-effective and welfare increasing tool for addressing environmental challenges like waste prevention and recycling.

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<sup>2</sup> Further details to be found in the following newspaper articles "Reduced convenience of waste disposal" (The Guardian, 9 Oct 2017), "Improved infrastructure capacity and options" (The Guardian, 21 Oct 2019), "More relevant information to consumers" (Göteborgs-Posten, 4 Aug 2019), "Establishment of marketplace for used products" (The Guardian, 18 June 2019), "Legal restrictions about non-recycled products" (The New York Times, 16 March 2019), "Development of educational programs" (extract.se, 5 Feb 2019), "Higher product, landfill and incineration taxes" (The Times, 18 Feb 2019).

<sup>3</sup> When included on electricity invoices, tis is often referred to as 'Home Energy Reports' (HER).

## 2. Intervention Design

Similar to Home Energy Reports (HER), this study relies on comparisons with neighbours. Households received feedback on their waste generation compared to peers and highly efficient households in their neighbourhood. Two types of feedback were tested:

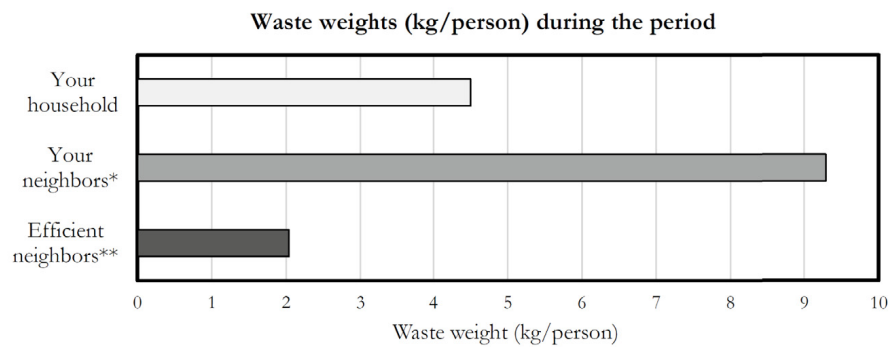
- **Standard Feedback (HER-style):** Monthly letters showing comparisons of a household's waste to:
  - The average waste of their neighbours.
  - The most efficient households (bottom 20%).

This feedback included positive reinforcement, such as smiley faces and ratings like "Good" or "Excellent." Figure 1 shows an example of what this feedback looked like.

**Figure 1. Standard feedback (HER-style).**

**Your own waste and your neighbors' waste, during the period 2019-03-13 to 2019-04-09**

During this period, your bin for unsorted waste has been collected three times.



\* The average is based on about 100 households in your neighborhood.

\*\* This 'waste efficient' neighbor represents the average among the 20% of households with the least waste, based on about 100 households in your neighborhood.

### Evaluation of your waste weight

EXCELLENT 😊😊      GOOD 😊      ROOM FOR IMPROVEMENT

- **Dynamic Feedback:** Highlighted short-term changes, such as how much a household's waste had decreased compared to their peers' recent improvements.

**Figure 2. Dynamic feedback.**

During the latest period, your waste weight was 0.3 kg/person lower than during the preceding four weeks.

Over the same period, 45 percent of your neighbors have managed to reduce their waste by more than your household.

In one of the municipalities, feedback frequency was also tested: one group received monthly letters, while another received quarterly updates.

### 3. Key Results

- **Waste Reduction:** Feedback reduced unsorted waste by **7–12%**, significantly larger than the effects observed in norm feedback studies applied to energy and water conservation, as well as other behavioural interventions in the waste management domain.
- **Behavioural Changes:** Most of the reductions came from increased recycling of packaging and food waste rather than illicit dumping or avoidance behaviours.
- **Targeted Effectiveness:** Households with higher initial waste generation saw the most significant reductions, while low-waste households showed minimal changes. There was no evidence of a “boomerang effect”, i.e. that efficient households reduced their efforts.
- **Persistence:** The reductions remained largely intact a year after the intervention ended, demonstrating the durability of the behavioural change.

### 4. Mechanisms of Change

The research explored three potential mechanisms behind the reductions:

1. **Recycling:** Waste composition analysis showed significant increases in recycling, particularly of food and packaging waste. A survey also indicated that many households improved their sorting practices.
2. **Prevention:** Some households reported reducing waste generation by buying fewer packaging-heavy products or placing "no-ad" stickers on their mailboxes.
3. **Illicit Disposal:** Municipal records showed no increase in illegal dumping, ruling out illicit disposal as a major factor.

### 5. Cost-effectiveness and Policy Implications

Norm-based feedback proved to be a highly cost-effective alternative to traditional waste reduction policies, such as tariff increases. Achieving similar reductions through tariff increases alone would require raising unit-based waste collection tariffs by 32–67% — a politically and socially challenging option. Under normal conditions, norm feedbacks also increase total economic welfare.<sup>4</sup>

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<sup>4</sup> This is true as long as the average willingness-to-pay for the norm feedback is above -2.3 euro per household. This must be regarded as a low level and, consequently, Ek and Söderberg (2024) concluded that it is highly likely that the intervention would generate an economic surplus.

Moreover, feedback can easily be scaled and integrated with existing systems like Pay-as-you-throw, where households already pay fees based on their waste weight.

The study demonstrates that norm-based feedback motivates behavioural change without imposing additional financial burdens on households, making it a complementary policy tool alongside tariff mechanisms.

Equipping a waste truck with a scale cost about 0.2 euro per household and year,<sup>5</sup> and the cost of the norm intervention, assuming three letters are sent to each household in every two-year cycle, is 0.86 euro per household and year. The economic benefits will depend the tariff structure used, the effect of the intervention, and the waste infrastructure (e.g. bin types) and collection system (e.g. separate bins, optical sorting, or multi-compartment bins) that is used.

If a local government is using Pay-as-you-throw, the intervention increases welfare as long as the variable tariff component is not 'too high'.<sup>6</sup>

## 6. Broader Applications and Lessons

This research highlights the power of behavioural nudges to address waste management aligned with the Waste Hierarchy, notably by significantly reducing waste generation and increasing recycling of municipal waste. Unlike economic incentives, which can face resistance or lead to unintended consequences, feedback-based approaches leverage social norms and peer comparisons to drive sustainable behaviours.

## 7. Future Considerations

While the intervention proved successful, its scalability and long-term impact may depend on several factors:

1. **Public Acceptance:** Some households opted out of receiving feedback, highlighting the need to design interventions that are engaging and non-intrusive.
2. **Cultural and Regional Contexts:** Results may vary in regions with different social norms or waste management infrastructures.
3. **Integration with Broader Policies:** Combining feedback with other waste reduction policies, like improved access to recycling facilities, could enhance its effectiveness.

## 8. Conclusion

Norm-based feedback is a low-cost, scalable, and effective tool for reducing household waste and improving recycling rates. The intervention aligns well with global and regional environmental goals, such as the EU's target to recycle 65% of household waste by 2025. By leveraging behavioural insights,

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<sup>5</sup> One truck can serve 10,000 households in detached houses, assuming it serves each household 3 months every 24 months (incl service and repair time). Each scale lasts 10 years and the capital cost is 20,000 Euro.

<sup>6</sup> Based on the cases reported by Ek and Söderberg (2024), the threshold for the variable component is around 0.25 euro per kg of waste.

policymakers can achieve significant environmental benefits without relying solely on economic incentives or regulations.

This study provides a roadmap for municipalities to enhance waste management systems, demonstrating that simple, tailored feedback can drive meaningful and lasting change in household behaviour.