



Co-funded by
the Intelligent Energy Europe Programme
of the European Union



CONCERTED ACTION
ENERGY EFFICIENCY
DIRECTIVE

Real-time feedback to kick-start consumer interest

Henk van Elburg
Netherlands Enterprise Agency
Henk.vanelburg@rvo.nl

Sofia, 20th October 2017



Presentation overview

- Part 1: Smart Meters in NL
 - Update on implementation
 - Results of public research
 - bimonthly home energy reports
 - alternative information devices/ applications
 - Market conditions for consumer engagement

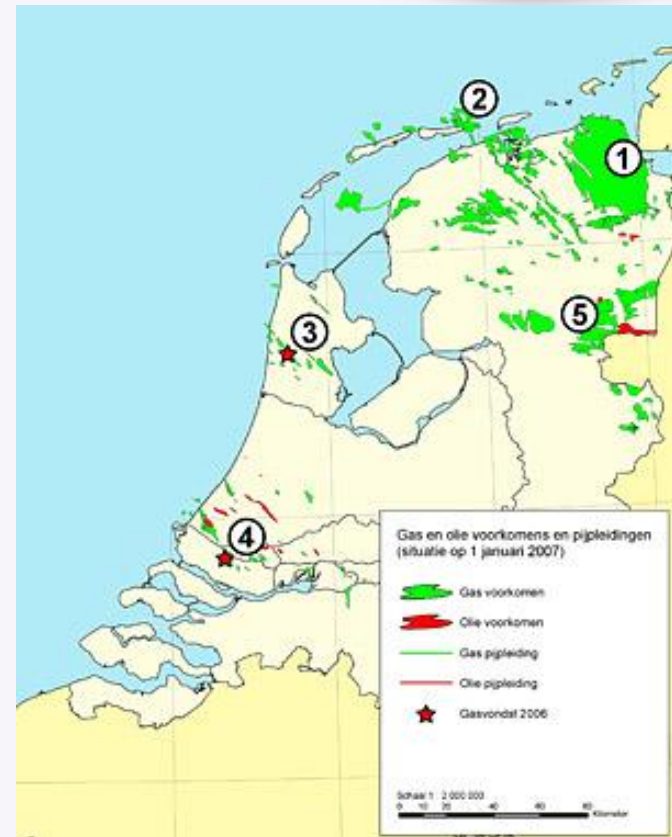
- Part 2: Good example in NL: Toon®
 - Smart thermostat and energy display
 - Household brand: 77% of NL consumers knows Toon®
 - Sold > 300.000 in the Netherlands
 - Savings Toon users: 5.0% G, 2.2% E



Part 1: smart meters in NL short introduction



- 17 million people, 8 million connections
- Dual fuel nation
 - 1959: natural gas in Slochteren, Groningen
 - 2000: > 95% gas connection
 - 2015: less extraction due to seismic effects
- Natural gas major residential load for
 - cooking (85%), heating (97%)
- Smart Meter business case (2011)
 - Costs: app. € 3.3 billion
 - Benefits: € 4.1 billion
 - Mainly calculated energy savings
- Legal roll-out in NL
 - Delivering smart meters: network operators
 - Tools for consumer engagement: market responsibility



Smart meter options for acceptance and feedback



1. Refuse smart meter
2. Accept smart meter and select operating mode
 1. No communication
 - P3: No, like a traditional meter
 - P1: Real-time E, 5 minute G
 2. Fixed moment communication
 - P3: annual bill, bimonthly reports, switching, removal
 - P1: OK
 3. Every day communication
 - P3: next day, 15 minute E, hourly values gas
 - P1: OK

Mandated feedback: (bi)monthly home energy reports



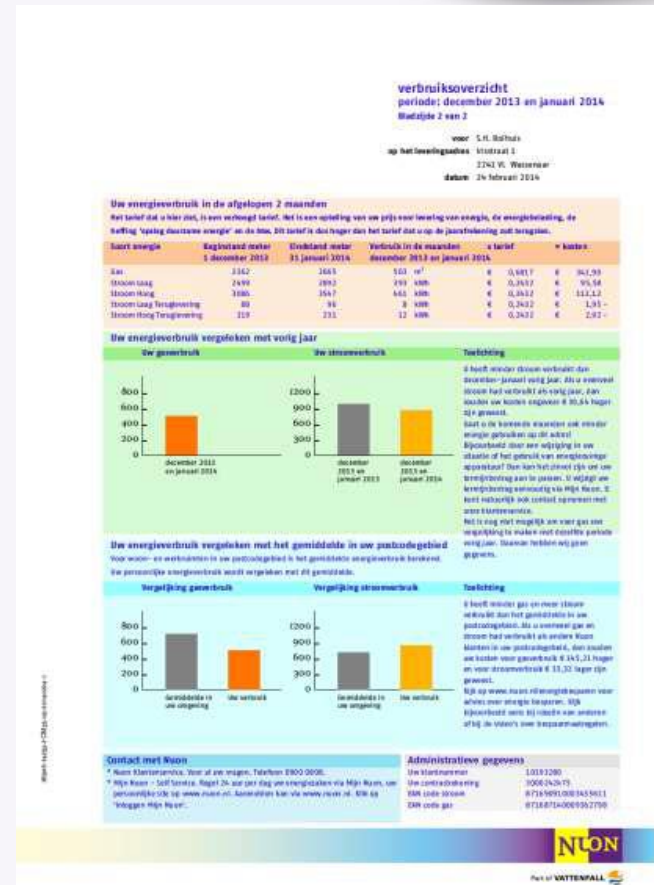
CONCERTED ACTION
ENERGY EFFICIENCY
DIRECTIVE

- Expected savings in CBA
 - Only opt-out feedback tool
 - 3.2% E, 3.7% G

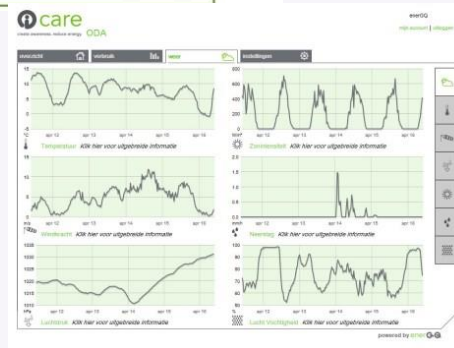
- Research 2013
 - 700 households against controls
 - Scientific reliable (random replacements, long history, housing type etc)

- Outcomes
 - Savings 0.6% E, 0.9% G
 - Low-profile communication
 - Online: unaware or spam
 - Paper based: aware, effects

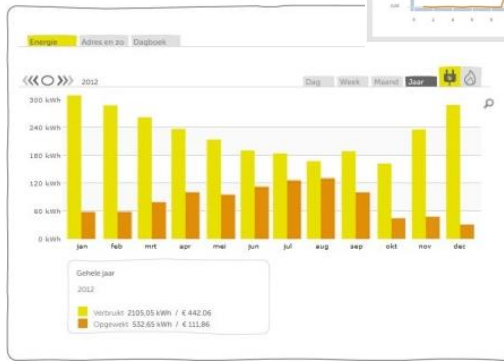
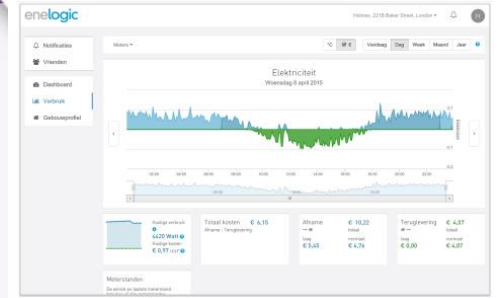
- Early learnings
 - 1st notification paper based
 - Better design/presentation



P3: next day feedback tools



Realtime feedback tools P1



Consumer Engagement in NL



- Policy approach: broad market for energy engagement
 - There is a market for non real-time PC web tools (P3)
 - analytics for energy literates, already engaged, own generation
 - sophisticated tools for in-depth analysis, investment decisions
 - There is a market for real-time (mobile) apps (P1)
 - analytics and controls for energy literates, already engaged
 - access away from home, essential notifications
 - **There is no market (yet) for in-home displays!**
 - engagers for 'novice' consumers: less engaged / technology-minded
 - 'kickstarter savings' from behavior (quick wins), not (yet) investments
- Will the market deliver? Challenges ahead
 - Dutch market: slowly emerging and imperfect conditions
 - Slowly: local roll-outs, small-scale
 - Imperfect: mainly for energy literates, not (yet) for 'novices'
 - Demand side: low consumer willingness to buy/ invest

Part 2: Successful energy management in NL: TOON



- **Smart thermostat, energy manager and in-home display for households**
 - **Household brand: 77% of NL consumers knows Toon®**
 - **Sold > 300.000 in the Netherlands**
- **Scientific research: Toon is an effective platform for energy saving**
 - **2013 – 2015 effect research**
 - **5.300 Toon households**
 - **71.000 control households**

Figure 1: The Toon smart thermostat tablet device. With (1) historical electricity consumption; (2) historical gas consumption; (3) programme customisation, social comparison, usage pricing and baseline usage; (4) thermostat programme category; (5) manual thermostat adjustment. © energyfestival.eu.

Ways in which Toon customers can save energy



Behavioural change



Electra: turning off lights, whitegoods, etc



Gas: shorter showering, lower thermostat setting, etc



Investments



Gas: improvements to central heating system



Gas: insulation, double glazing, thicker curtains, etc



Electra: replace whitegoods by more efficient versions, etc

Factors that can potentially harm energy saving

- Thermostat programme being used to increase comfort
- After an initial period of savings, there might be a rebound effect¹

¹ Van Dam (2013), Smart Energy Management for Households



Research methodology saving effects (1/2)



CONCERTED ACTION
ENERGY EFFICIENCY
DIRECTIVE

In totaal 5,3K Toon klanten kunnen meegenomen worden in de analyse

≡ Figuur 1: Selectiecriteria	Toon	SM 
Min. 1 nota sinds 2010, min. 360 dgn	93K	327K
Herleid verbruik is bekend	55K	224K
Klant is particulier, krijgt EG en heeft werkelijke standen opgegeven	50K	143K
Alleen nota's sinds verhuizing	38K	123K
Outliers verwijderd ¹ , minimaal 2 opeenvolgende nota's bekend	25K	69K
Standen voor/na installatie bekend	5.4K	35K
Geen teruglevering (zonnepanelen)	5.312	32K
Overlap	2.100	

Omvang studie

Hiermee is dit het grootste onderzoek van zijn soort tot nu toe dat zich richt op 1 specifieke energiedisplay!

≡ **Figuur 2: Beschrijving van de databronnen**

Datawarehouse

- 1,5 mln huishoudens
- Jaarlijkse standen
- 5,3K Toon klanten bruikbaar
- Kenmerken van huishoudens

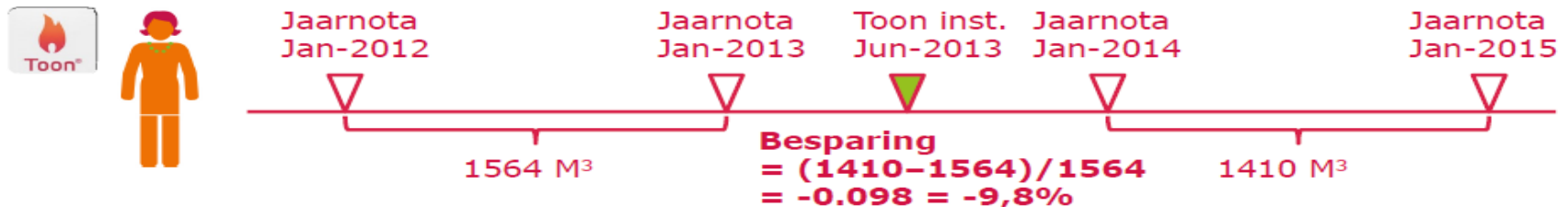
P4 standen

- 26K huishoudens met slimme meter
- Standen per kwartier
- 850 Toon klanten

Research methodology into savings effects of Toon (2/2)

Hoe wordt de besparing berekend?

1. Bereken besparing van 5,3K Toon klanten voor en na installatie



2. Bereken de controlegroep besparing over dezelfde periode



Besparing Toon groep
Besparing controlegroep

Besparing door Toon?

PROBLEEM: Toon groep en controlegroep zijn niet hetzelfde!

3. Controleer voor de verschillen tussen Toon klanten en controlegroep

- Woningtype (appartement, vrijstaand, etc)
- Eigendom (koop, huur)
- Woonoppervlak
- Gezinsgrootte
- Leeftijd
- Heeft slimme meter (J/N)
- Aantal graaddagen tijdens verbruiksjaar¹
- Maand van het jaar¹
- Is benaderd met Toon campagne²

Main results in savings (controlled for attributes)

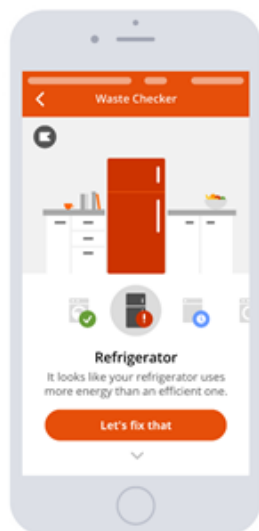


- Persistent savings: 5,0% Gas, 2,2% Electricity (in line with previous studies NL, UK)
 - high gas savings: commitment to energy conservation whilst interacting with the device: lower settings
 - Gas savings persistent: no rebound effect
 - Subpopulation analysis: apartments and smaller rental homes save more
 - small houses, behavioural measures have relatively larger effect on energy bill
 - Toon: habitual behavior change rather than investments in home improvement
- Lessons learned:
 - Toon: commercially widespread and proven effective as a savings tool
 - physical IHD is crucial: high frequency consumption information and decision support for household energy conservation, family interaction
 - Central implication for energy conservation policy: stimulate further integration of different types of intervention into IHD devices
 - Future features of IHD's: dynamic pricing and goal setting

New features expected

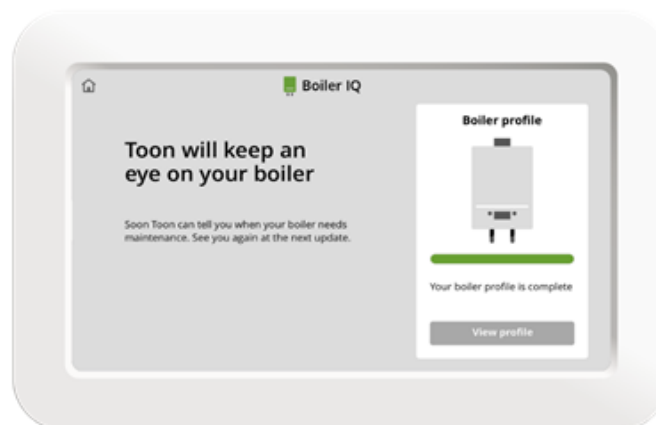
New features on Toon allow for even more savings over time

Personalized waste checker



Is my fridge functioning properly?

Remote boiler monitoring



Is my central heating working properly?

Thank you for your attention



CONCERTED ACTION
ENERGY EFFICIENCY
DIRECTIVE

Henk van Elburg

Senior project officer

Netherlands Enterprise Agency

P.O. Box 8242

3503 RE Urecht

Netherlands

Tel: + 31 (0) 6 535 41 319

Web: www.RVO.nl

Email: henk.vanelburg@rvo.nl

