

Behavioural analytics for use in causal attribution in a market transformational energy efficiency program

Offered by

Kevin Monte de Ramos, KMDR Recherche
Carl Acocella, Hydro Quebec



KMDR Recherche

Développement de procédures de gestion durables

Contacting the Authors

Kevin Monte de Ramos
Management Consultant

KMDR Recherche
803-1009 rue de Bleury
Montreal, QC H2Z-0A3
Canada

Email: KMONTTE@kmdr.net
Cellular: 802-881-4806

Carl Acocella
*Bureau de projects, evaluation et
gestion de l'information*

Hydro Quebec
2 Complexe des Jardins, Tour Est
Montreal, QC H5B-1H7
Canada

Email: Acocella.Carl@hydro.qc.ca
Cellular: 514-879-4100 x-7297



A Little About Us

Evolving Evaluation Requirements

Growing public demand for energy efficiency has required utility and government programs to evolve beyond simple resource acquisition models. Market transforming program activities require special analytical methods to properly attribute savings. The industry can no longer rely on simple net-to-gross calculations to document broad market effects.

RELATED COMPETENCIES

- ✓ Market Characterization Study
- ✓ Portfolio Planning
- ✓ Logic Modeling
- ✓ Program Design
- ✓ Savings Attribution Models
- ✓ Measure Selection Protocols
- ✓ Advanced Analytics

Kevin Monte de Ramos
Portfolio Planning/Tracking

Larissa Matveeva
Organizational Analytics

Tom Zimmer
Billing Analysis/Evaluation

Jean-Guy Allard
CI&I Programs

Dave Yanosko
Residential Programs

Roy Bacani
Transportation Programs



KMDR Recherche
803-1009 rue de Bleury
Montréal, QC H2Z-0A3
Canada

EMail: INFO@kmdr.net
TeleFax: 888-563-7638
Cellular: 802-881-4806

We assist organizations charged with drafting energy policy and utilities seeking to achieve greater energy efficiency.

With personnel committed to the *green economy*, long before it was named as such, our staff offers a perspective that leads to better designs, robust evaluations, and functional protocols. This results in greater energy savings and demand reductions.

KMDR Recherche has strategic alliances that bring leading industry talent to the table. We work with our clients to customize portfolios; yielding the greatest energy savings per unit of investment.

More importantly, we have developed analytical approaches that protect your energy efficiency investments by attributing market effects to your efforts. By so doing, clients have realized energy savings that cost less than 2¢/kWh!

A penny saved really can be a dollar earned.





KMDR Recherche

Développement de procédures de gestion durables

Table of Contents

1

Context of the Study

2

Methodology Employed

3

Measured Impacts

4

Conclusions and Recommendations



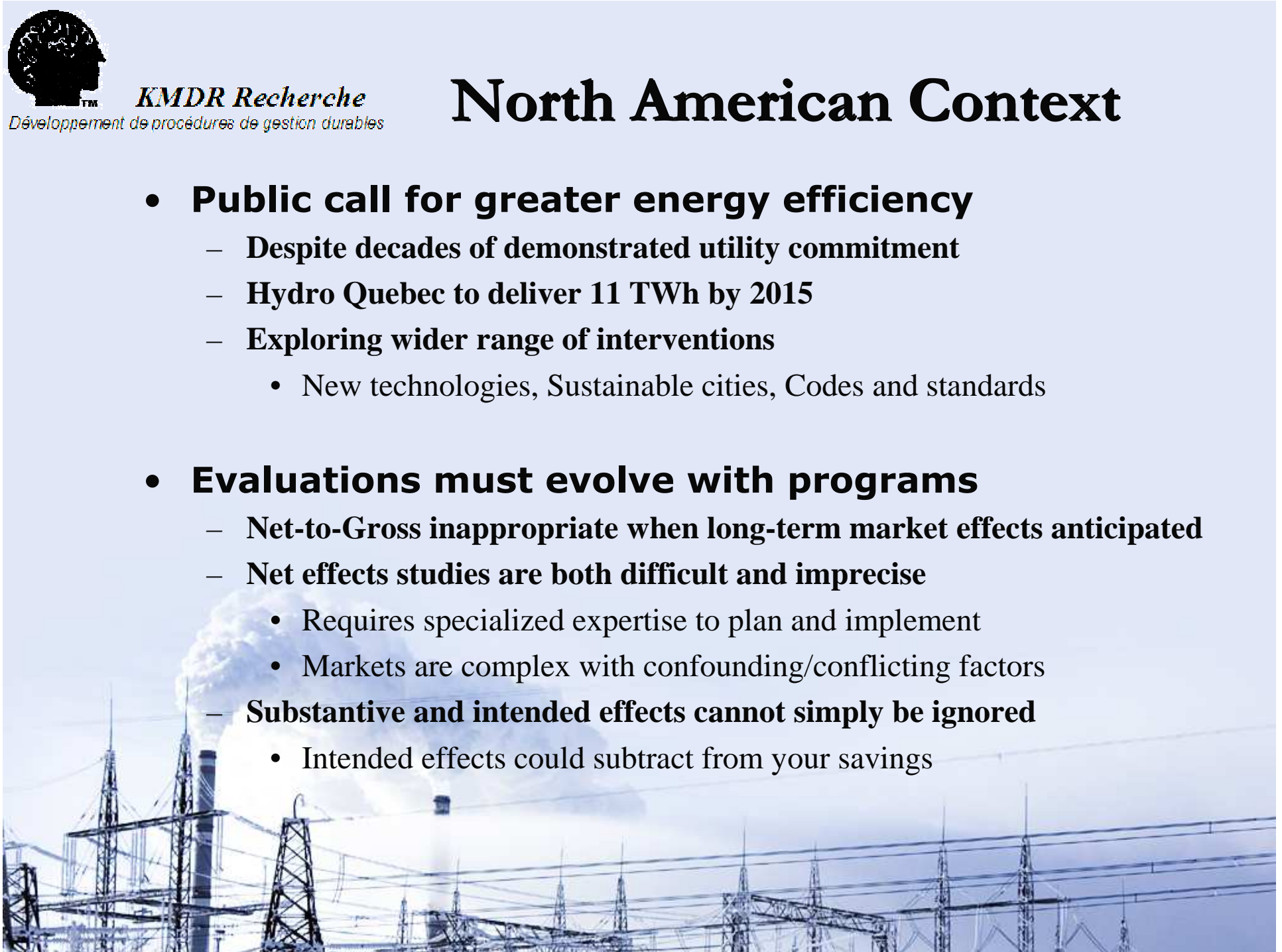


KMDR Recherche
Développement de procédures de gestion durables

North American Context

- **Public call for greater energy efficiency**
 - Despite decades of demonstrated utility commitment
 - Hydro Quebec to deliver 11 TWh by 2015
 - Exploring wider range of interventions
 - New technologies, Sustainable cities, Codes and standards

- **Evaluations must evolve with programs**
 - Net-to-Gross inappropriate when long-term market effects anticipated
 - Net effects studies are both difficult and imprecise
 - Requires specialized expertise to plan and implement
 - Markets are complex with confounding/conflicting factors
 - Substantive and intended effects cannot simply be ignored
 - Intended effects could subtract from your savings





KMDR Recherche

Développement de procédures de gestion durables

Program Overview

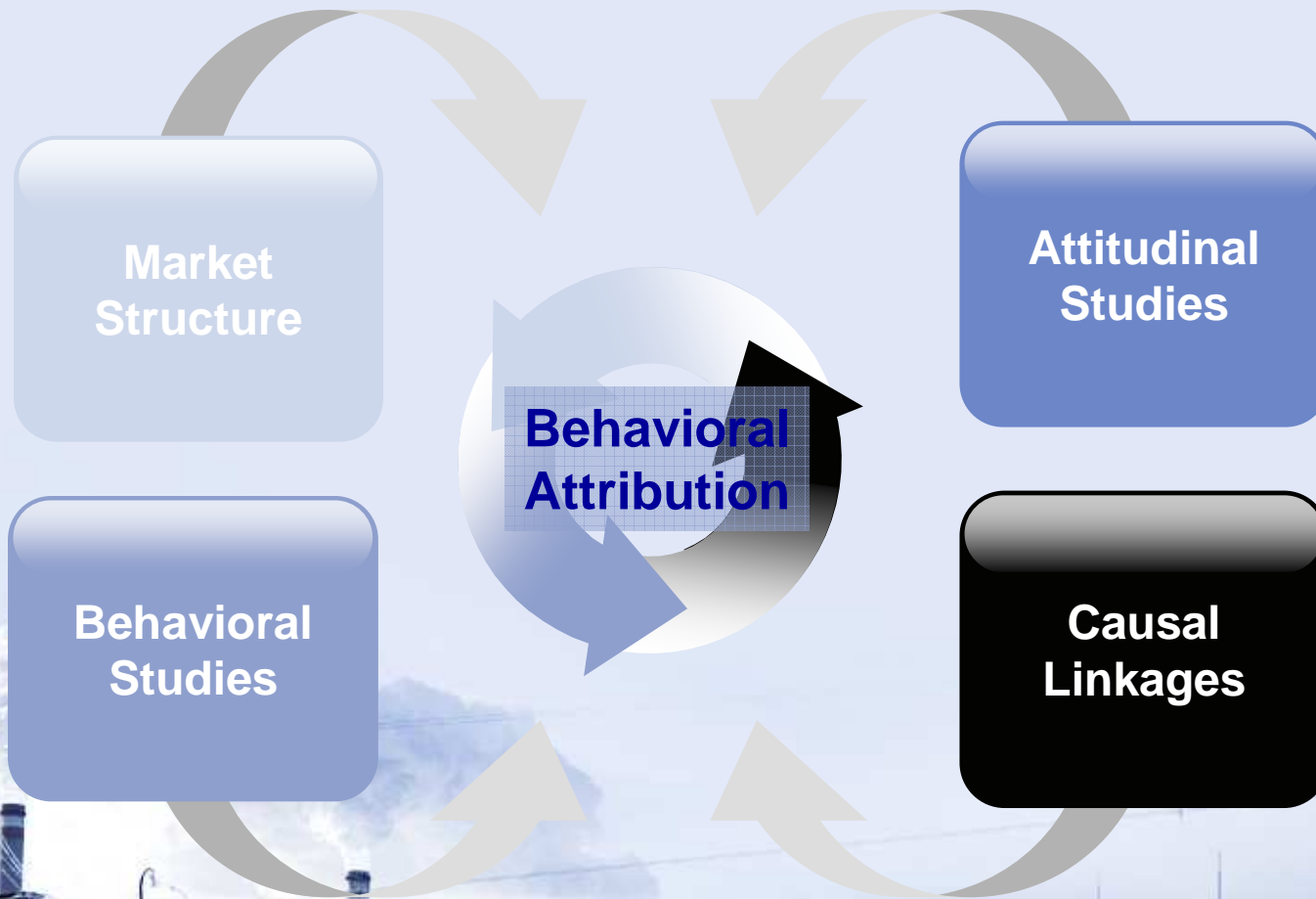
- **Refrigerator Recycling Program**
 - **Program objective**
 - Remove aged refrigerators and freezers from the market
 - **Incentive and offering**
 - Easy scheduling of appointment
 - Free removal of refrigeration unit from the home
 - Transport unit to central processing plant
 - Safe handling of ALL CONTAMINANTS
 - Recycle 95% of materials
 - \$60 customer rebate for qualifying unit
 - **Ads in local paper with 'air support'**
 - Messaging controlled by program administrators
 - » *\$60 incentive*
 - » *Up to 4x more energy efficient*
 - » *Better for the environment*



KMDR Recherche

Développement de procédures de gestion durables

Analysis Process

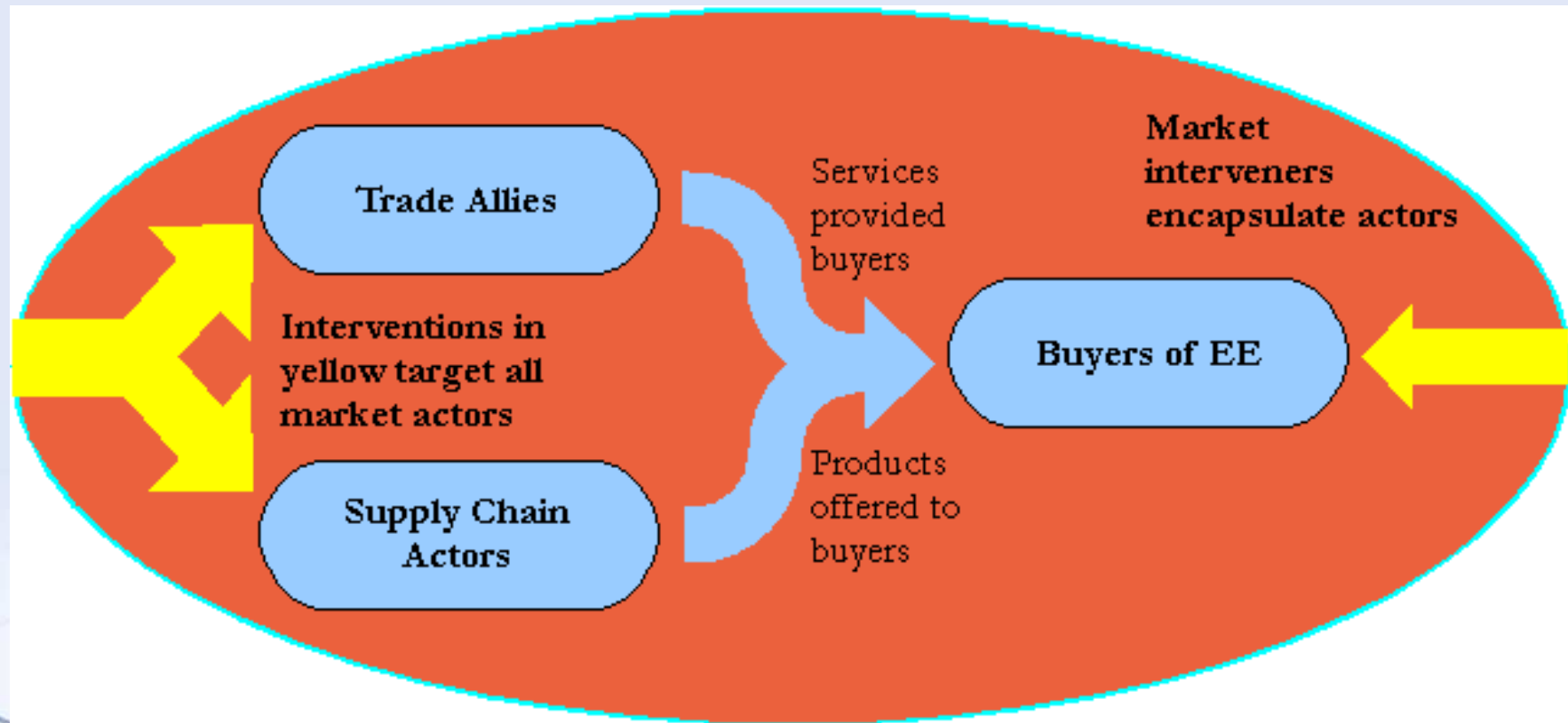




KMDR Recherche

Développement de procédures de gestion durables

Simplifying Market Effects Study

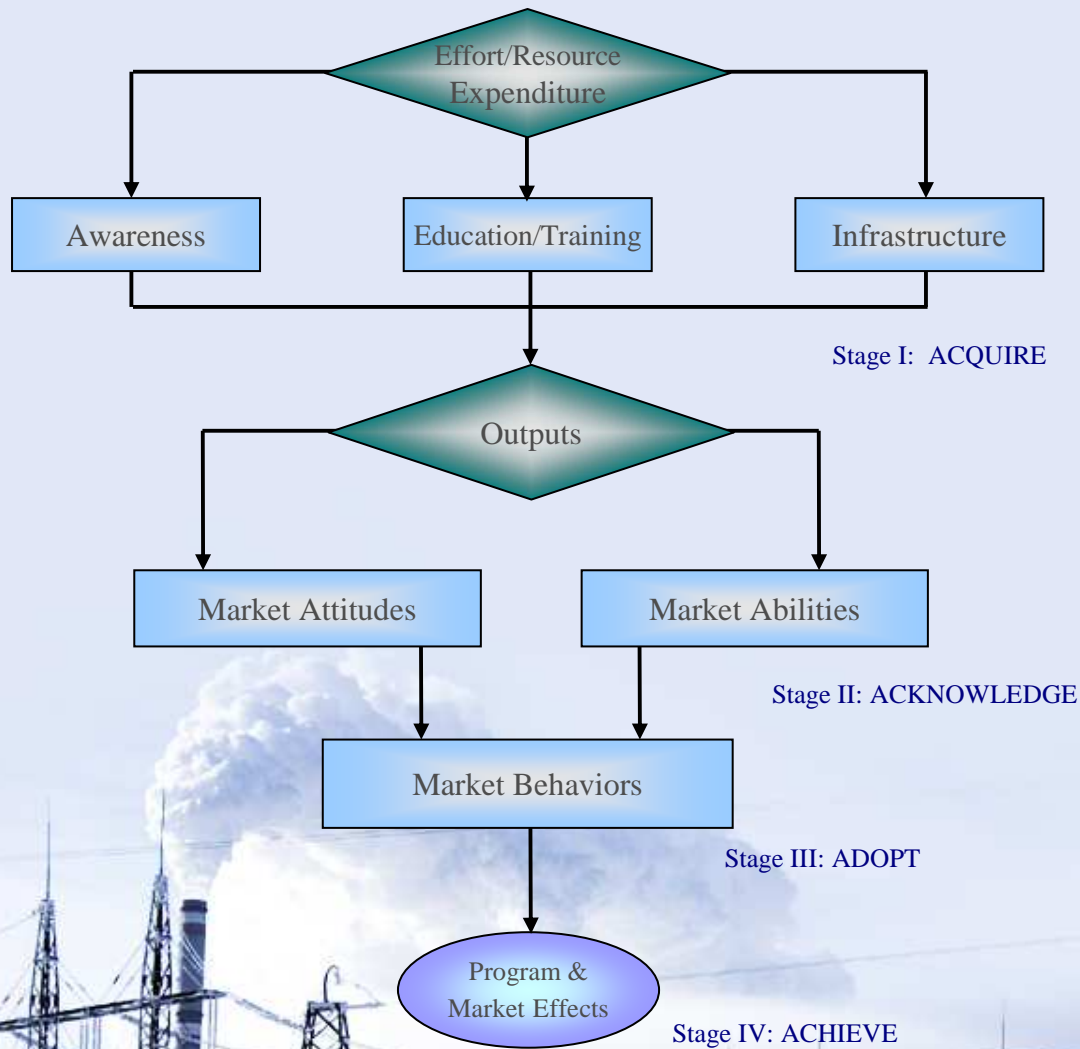




KMDR Recherche

Développement de procédures de gestion durables

Market Transformational Model

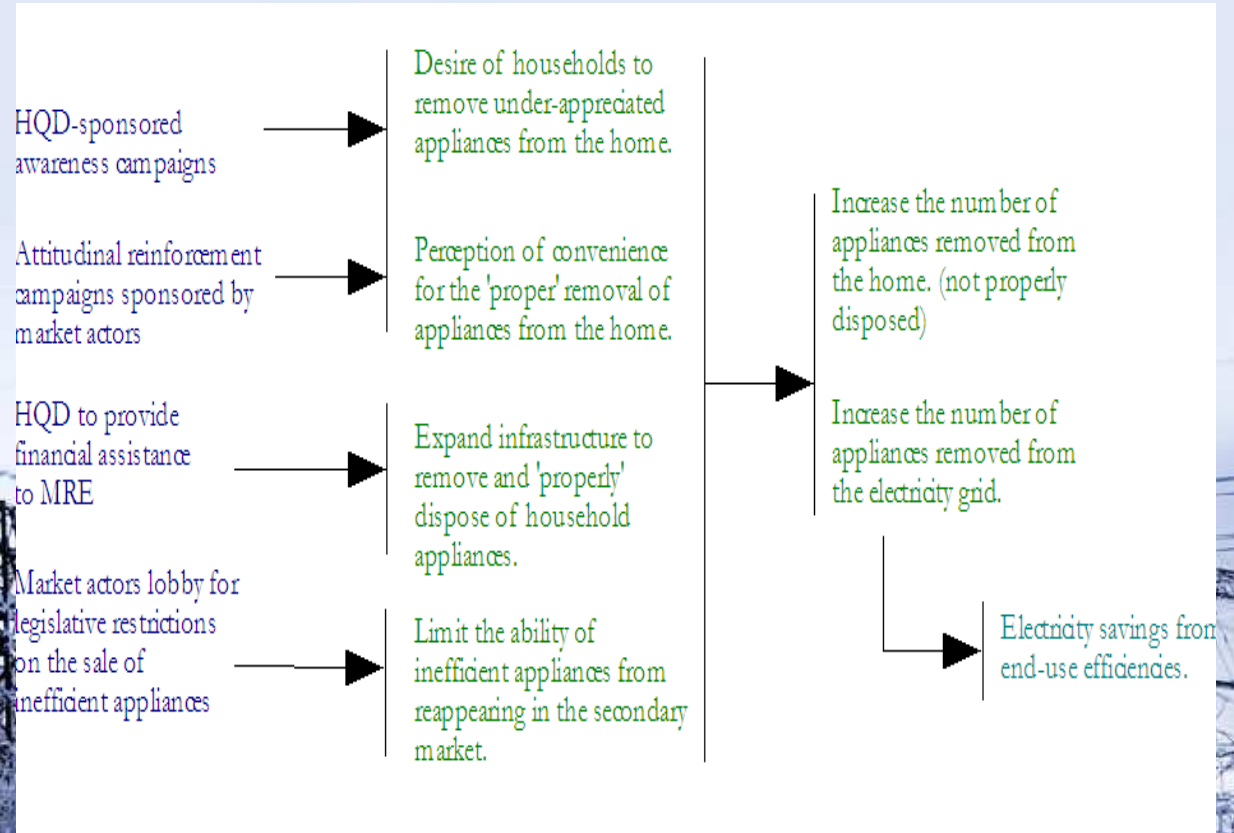




KMDR Recherche

Développement de procédures de gestion durables

Logic Models ... are a must!



There are NO MARKET EFFECTS savings attribution without demonstrated Intent.

The structure of program activities matter.

Why is this program a market transformation verses a resource acquisition program?





Can you claim market effects?

- *1. Does program theory identify specific market effects to be measured?*
- *2. Does program theory provide a causal linkage between program activities and the expected outcomes?*
- *3. Does program theory establish a pathway for sustained market intervention or the reoccurrence of program impacts beyond the program period?*
- *4. Is there a high probability that observed market changes resulted from program activities?*

- generalized from the
California Evaluation Framework



KMDR Recherche

Développement de procédures de gestion durables

Planned Savings

| Activity Description | During Program 2008-2010 3 years |
|--|--|
| Promotional and informational campaigns funded by HQD to realize planned program volume | 68% of plant capacity 255,000 units 242 GWh |
| Promotional and informational campaigns funded by HQD that spillover into the broader market | 20% spillover to other centers 82,500 units 78 GWh |
| Market effect on plant production | 20% of plant capacity 75,000 units 71 GWh |
| HQD and MRE support of new legislation to limit the resale of inefficient/aged appliances | Passage assumed somewhere within this 3-year period with some pre-legislation adoption |
| *Claimed Savings = 895 GWh | 391 GWh |

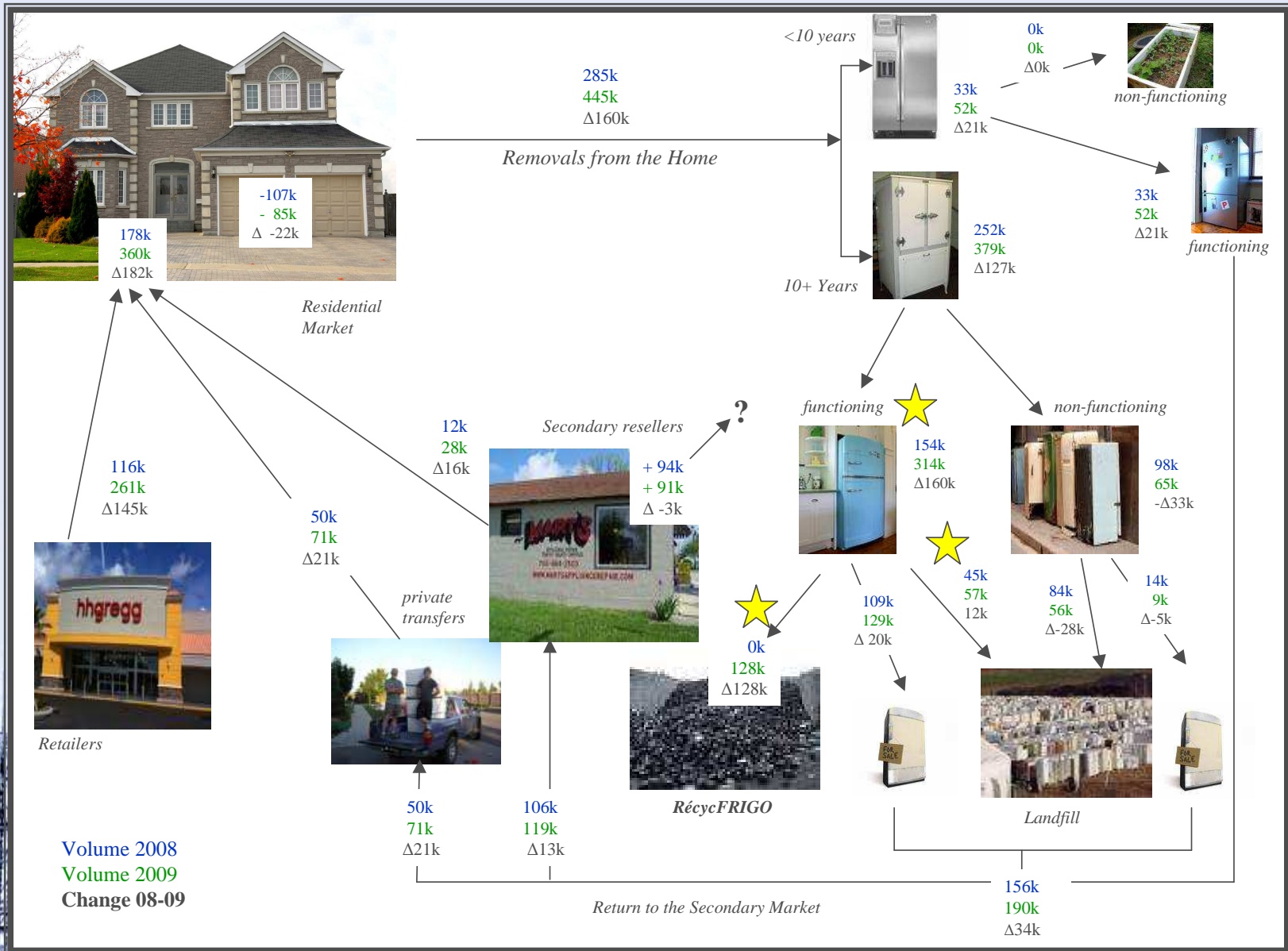




KMDR Recherche

Développement de procédures de gestion durables

Behavioral Dashboard





KMDR Recherche

Développement de procédures de gestion durables

Behavioral Change

| Targeted Effects | Pre-Program | Post-Program | Commentary |
|---|--------------|---------------|--|
| Number of qualifying units disposed from the home | 154k | 314k | 160k incremental 137.5k planned |
| Number of qualify disposals removed by the program | 0k | 128k | 128k incremental 110k planned |
| Number of qualify disposals removed by the other actors | 45k | 57k | 12.0k additional 27.5k planned |
| Number of units removed from the grid (total) | 45k (29%) | 185k (59%) | 140k incremental 137.5k planned 2.5k surplus |





KMDR Recherche

Développement de procédures de gestion durables

Establishing Net Savings

- **Without market tracking**

- Net-to-Gross protocols applied
- 314k disposals - 128k program removals = 186k NP disposals
- 57k (31%) of the 186k non-participant disposals removed naturally
- Therefore, $128k \times .69 = 89k \text{ units} \times 948 \text{ kWh/unit} = \underline{84} \text{ GWh savings}$

- **With market tracking**

- Net market effects protocols used
- 154k disposals pre to 314k disposals post; $\Delta 160k$ incremental disposals
- Of the 154k disposals, just 45k removed naturally
- Of the 314k disposals, 128k removed via the program and 57k removed naturally
- Net effect = $128k + (57k - 45k) = 140k$ incremental removals
- Therefore, $140k \times 948 \text{ kWh/unit} = \underline{133} \text{ GWh savings}$

- **Net Effects vs Net-to-Gross**

- $133 \text{ GWh} - 84 \text{ GWh} = 49 \text{ GWh}$
- 1.12¢/kWh verses 29¢/kWh
- The equivalent of \$14.2 million worth of program savings

Conclusions

- *Market effects can lead to relatively inexpensive savings attribution; although not a replacement for program investment*
- *Challenging to move from resource acquisition to market transformation*
 - *coaching needed to link savings attribution with program design*
 - *service providers concerned about units, utility concerned with savings*
 - *this is a transformational effort in itself*
- *Utilities should consider the impact of evaluation approaches on savings attribution. The impacts can be substantial as we have seen. HQD had the foresight to anticipate these effects and will realize a \$14 million savings ... If only I were paid by the kWh!*



KMDR Recherche

Développement de procédures de gestion durables