

Industrial Decision Making: Drivers and Hurdles to Implementing Low-Cost/Low-Payback Conservation Measures

Vincent Dufresne, Eng. (in QC), CEM, CMVP

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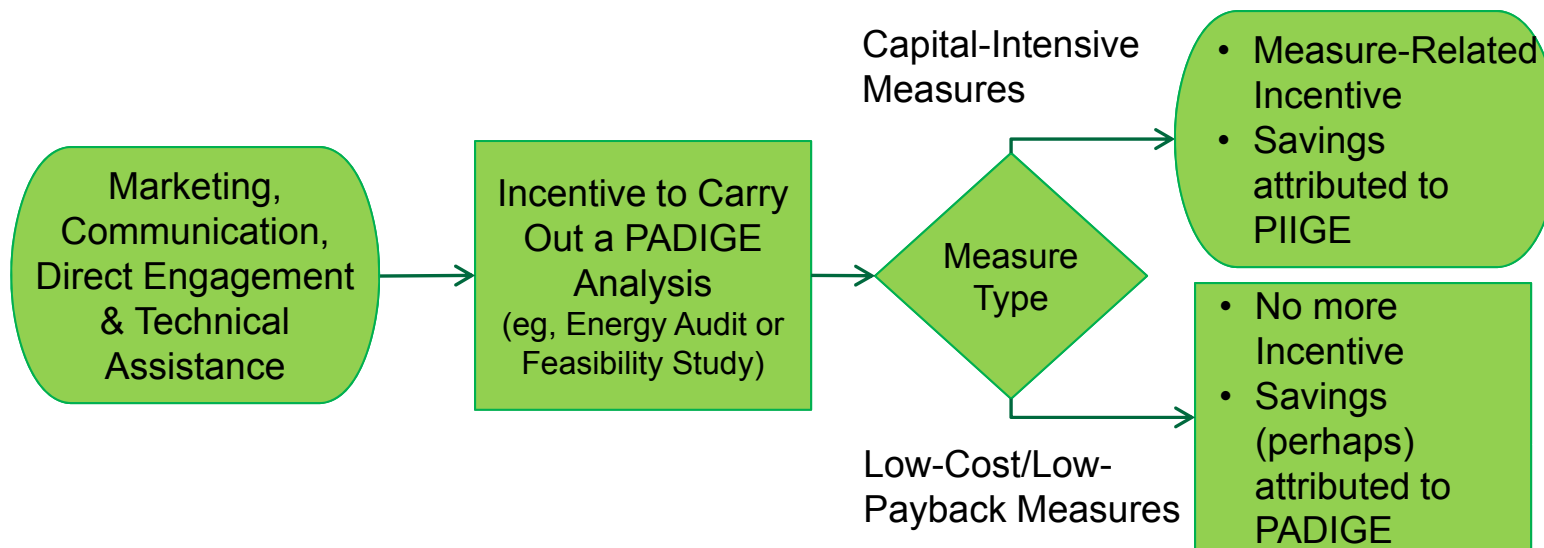
PADIGE Analysis Attribution Study: Overview

- Hydro-Québec 2003-2010 Large Industry Program Tactics
- Impact Attribution Challenges
- Attribution Study Methodology
- Results and Interpretation
- Program Implementation Implications

Note: The PADIGE Attribution Study was not carried out as part of Hydro-Québec formal evaluation framework.

PADIGE Analysis

- Analysis and industrial demonstration program for large enterprises
 - Acronym in French: PADIGE
- Incentive: 50% or up to \$25,000 for a PADIGE analysis (eg, energy audit or feasibility study)



PADIGE: Programme d'Analyse et de Démonstration Industrielle – Grande Entreprise
PIIGE: Programme d'Initiatives Industrielles – Grande Entreprise

Écolectrique Network

- Recognition for corporate achievement in energy conservation as participants in Hydro-Québec programs
- Joint promotional and public relations efforts
- Key accounts only, in the industrial, commercial and institutional sectors
- Criteria: realizing 5% electricity savings or at least 50 GWh, having an energy master plan, and an in-house energy manager
- Membership: 3 companies in 2006, 24 in 2008, 50 in 2011



Hydro Québec

Accueil Hydro-Québec - Clients d'affaires - Grande puissance

Accès espace client - Portail sécurisé

Services

Comprendre votre consommation

Qualité de l'onde

Conditions de service, normes et méthodes

Exigences, normes et codes du réseau

Efficacité énergétique

Réseau Écolectrique

Description et critères

Membres

Visibilité

Autres liens utiles

RÉSEAU ÉCOLECTRIQUE
RECONNAÎTRE L'EXCELLENCE EN EFFICACITÉ ÉNERGÉTIQUE

RIO TINTO ALCAN
AMBASSADEUR DE L'EFFICACITÉ ÉNERGÉTIQUE

POUR EN SAVOIR PLUS >>>

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Le réseau Écolectrique d'Hydro-Québec regroupe les grandes entreprises reconnues pour leur leadership et leur performance exceptionnelle en matière d'efficacité énergétique.

Dans le cadre de nos programmes en efficacité énergétique, ces entreprises ont réussi à faire d'importantes économies d'électricité, se sont donné une politique d'efficacité énergétique et ont nommé au sein de leur personnel un représentant en la matière.

Désormais, un niveau Élite réunit les membres qui ont satisfait à des conditions plus exigeantes en matière d'efficacité énergétique.

MEMBRE DU RÉSEAU ÉCOLECTRIQUE

- Réduction de la consommation d'énergie d'au moins 3 % ou réalisation d'économies d'au moins 50 GWh par année.
- Adoption d'une politique d'efficacité énergétique.
- Désignation d'un responsable de l'efficacité énergétique.

NIVEAU ÉLITE

- Réduction de la consommation d'énergie :
 - d'au moins 20 % – puissance soustraite inférieure à 50 MW
 - d'au moins 6 % ou 250 GWh – puissance soustraite de 50 MW et plus
- Création d'un comité Énergie interne
- Présentation d'un tableau de bord avec indicateurs de l'efficacité énergétique

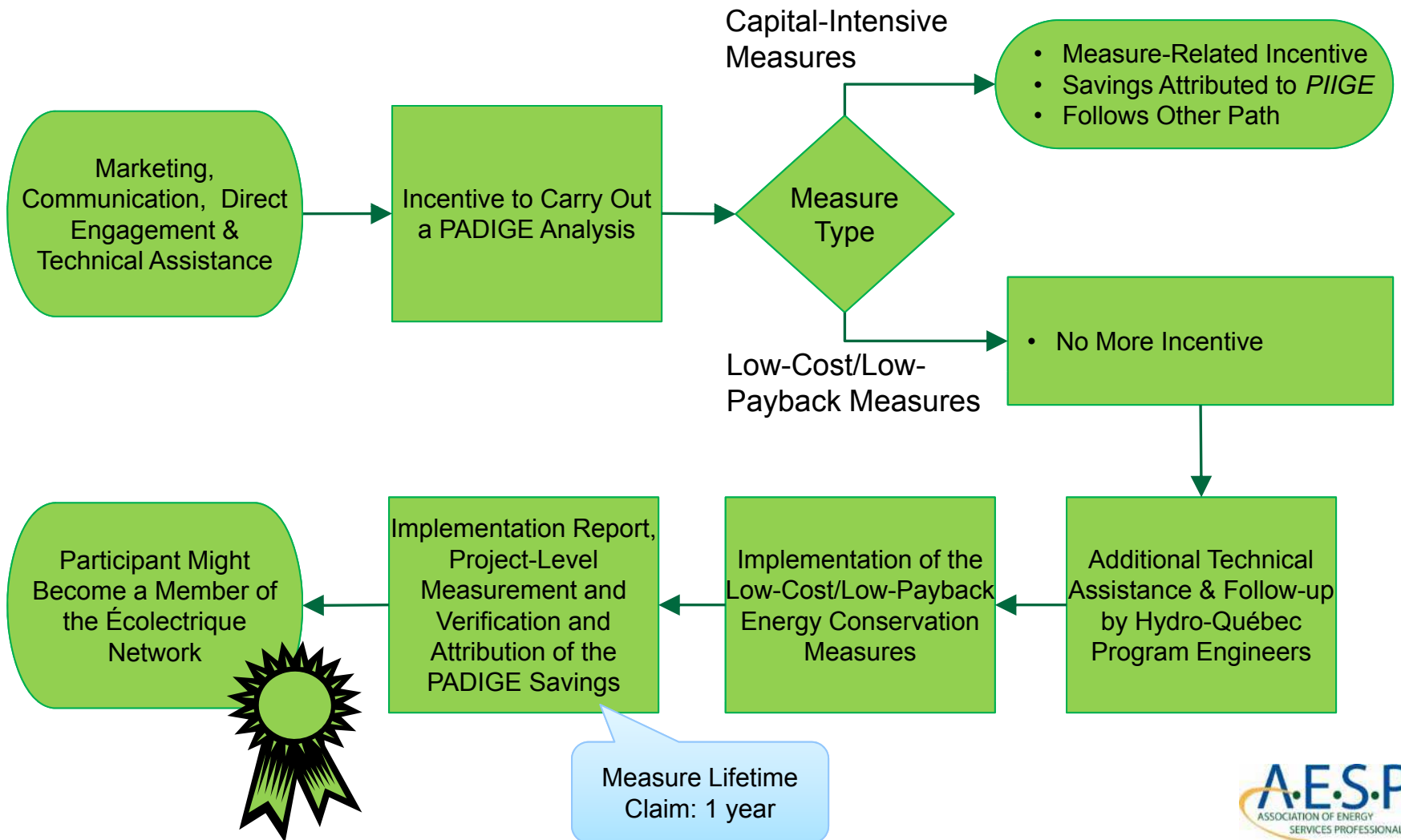
Accueil Hydro-Québec | Clients résidentiels | Clients d'affaires | Efficacité énergétique | Sécurité électrique | Végétation | Visites d'installations | Comprendre | Profil de l'entreprise et publications | Communiqués | Développement durable | Projets de construction | Emplois | Fournisseurs | Investisseurs | Confidentialité et sécurité

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<http://www.hydroquebec.com/grandesentreprises/ecolectrique.html>

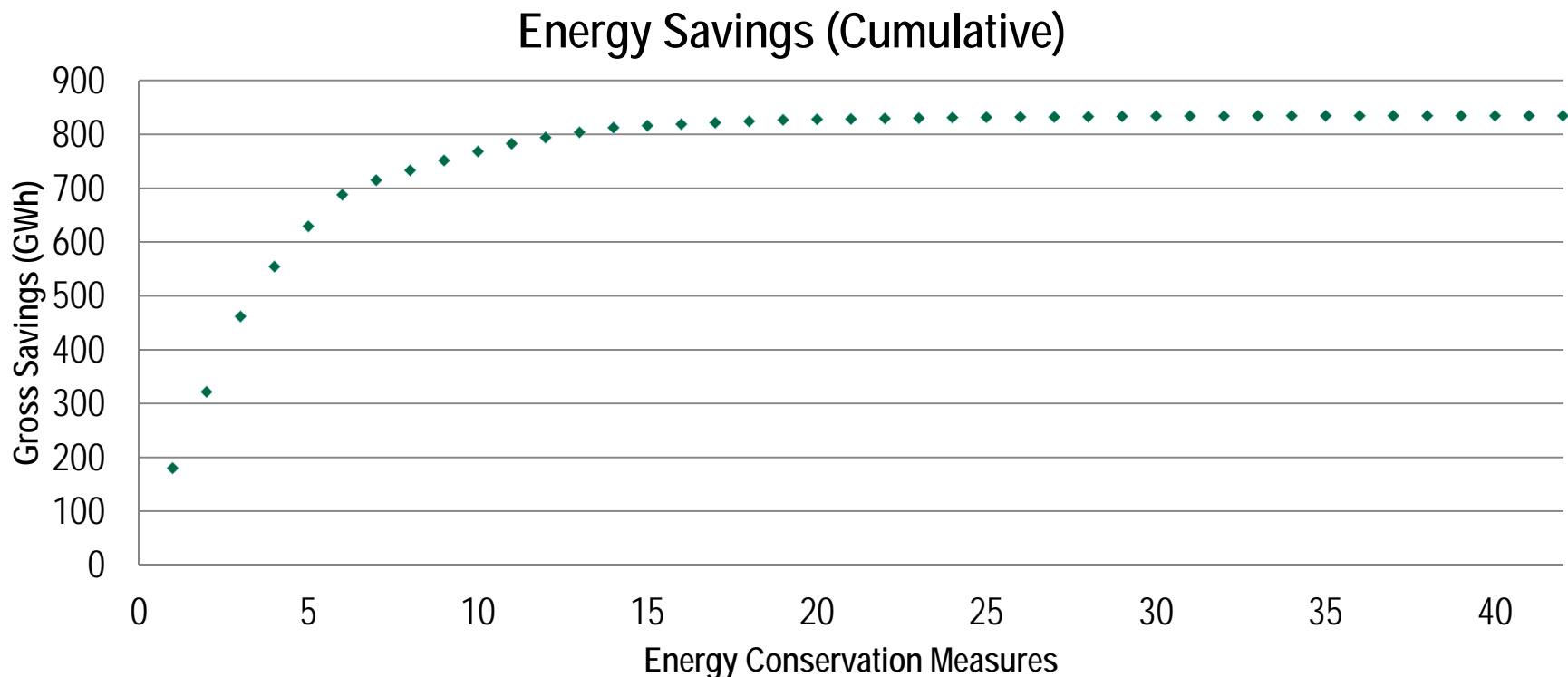
Hydro-Québec 2003-2010 Large Industry Program Tactics

Participation Process



PADIGE 2003-2010 in Numbers

- Population: 20 PADIGE analyses that identified low-cost/low-payback measures that were later implemented, 13 industrial plants, 42 conservation measures
- Impacts: 841 GWh \approx 17% of impacts claimed in 2003-2010



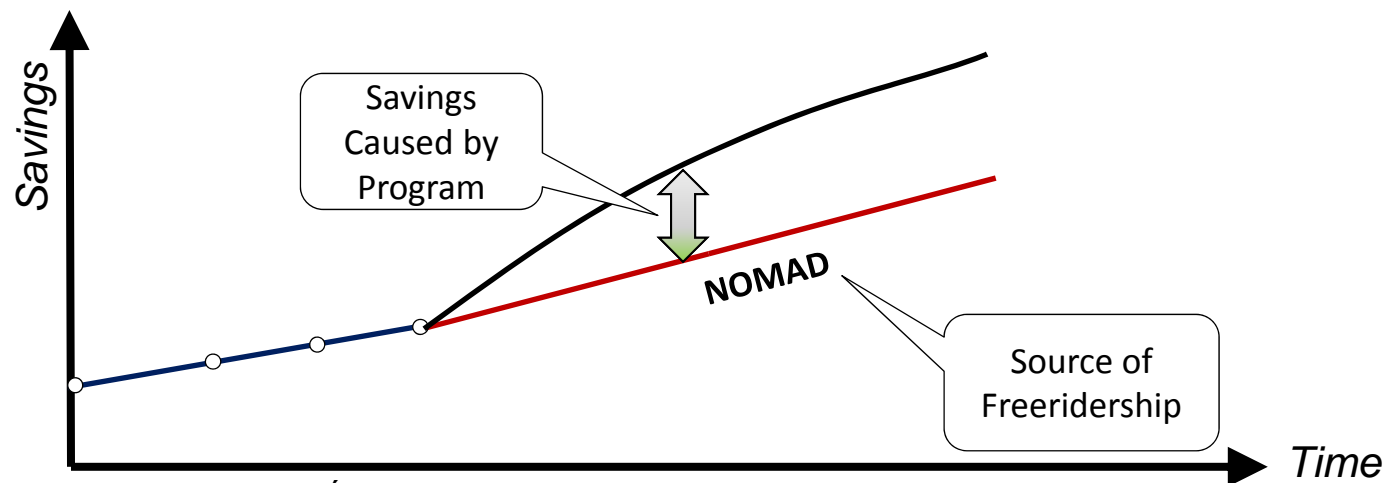
Impact Attribution Challenges

Large-Impact Conservation Measures

Questioning by the *Régie de l'Énergie* (Québec's regulator).

- the causality link between the savings and PADIGE analyses?;
- the freeridership distortion effect?; and
- the NOrmal Market Adoption of technology (NOMAD)?

Both the causality and the NOMAD questions were assumed to be answered by quantifying the freeridership effect.



Reference: Bureau d'Études Zariffa

Impact Attribution Challenges

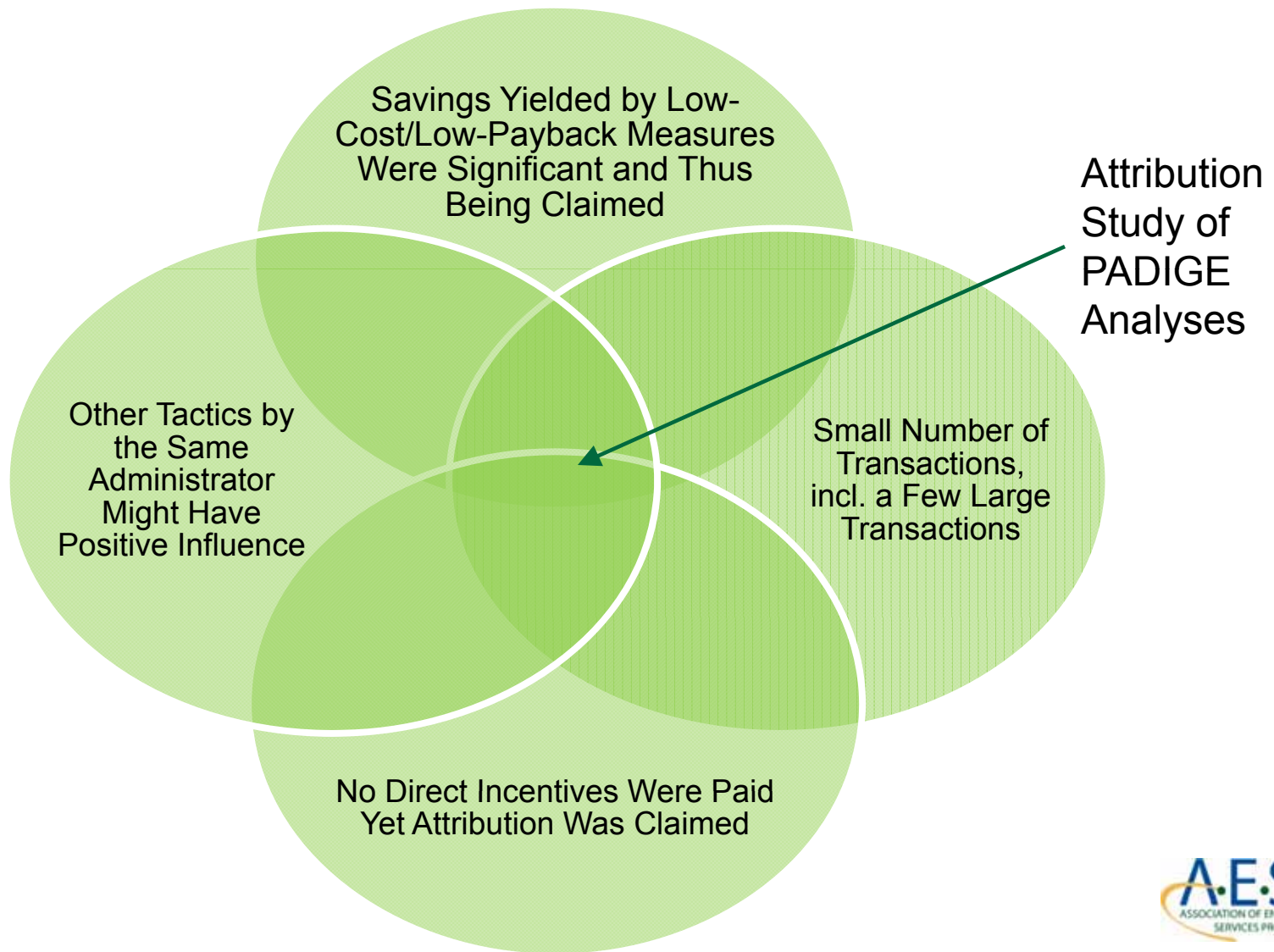
Existing Guidelines and Studies

1. CPUC – California Evaluators’ Protocols
 - Basic level of rigor: Self-reporting
2. Standardized Methods for Free-Ridership and Spillover Evaluation
3. Gaz Métro – Review of distortion effect evaluation methodologies

1. **CPUC**, *California Energy Efficiency Evaluation Protocols, Technical, Methodological, and Reporting Requirements for Evaluation Professionals*, April 2006, available at : http://www.calmac.org/events/EvaluatorsProtocols_Final_AdoptedviaRuling_06-19-2006.pdf
2. **National Grid, NSTAR Electric, Northeast Utilities, Unitil, Cape Light Compac**, *Standardized Methods for Free-Ridership and Spillover Evaluation—Task 5 Final Report (Revised June 2003, USA*, available at : http://www.cee1.org/eval/db_pdf/297.pdf
3. **Gaz Métro**, *Révision des méthodologies d’évaluation des effets de distorsion*, 2010, Canada, available at : http://www.regie-energie.qc.ca/audiences/Suivis/Suivi_PGEE_GM/GM_3-Methodologie-EffetDistorsion_20dec10.pdf

Impact Attribution Challenges

Need for a Specific Methodology



Scope of the Attribution Study

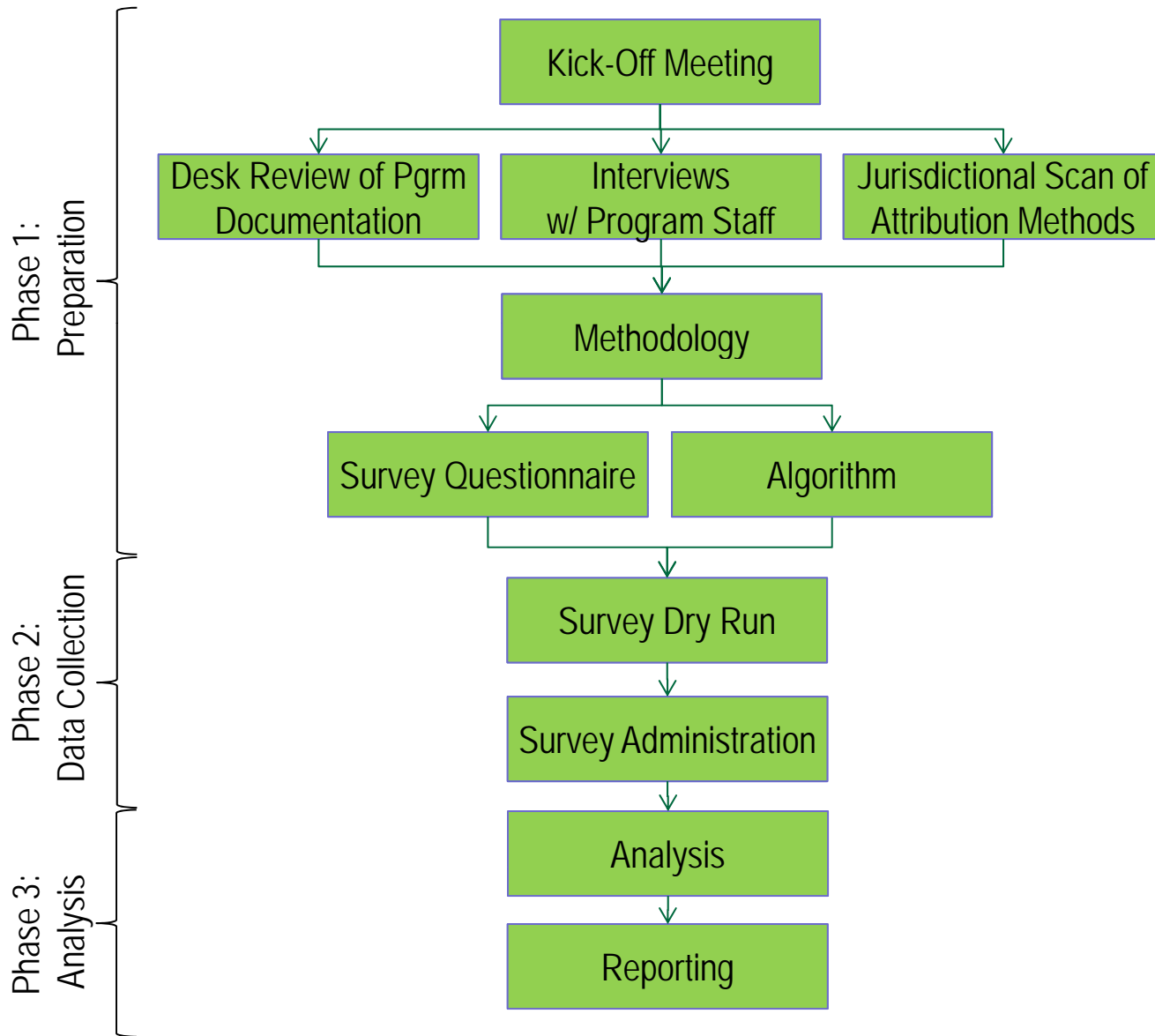
$$\left(\text{NET SAVINGS} \right) = \left(\text{GROSS SAVINGS} \right) \times \left(\text{REALIZATION RATE} \right) \times \left(\text{NET-TO-GROSS RATIO} \right)$$

Scope of the Attribution Study

$$\left(\text{NET-TO-GROSS RATIO} \right) = \left(100\% - \text{FREE-RIDERSHIP RATE} \right) + \left(\text{SPILLOVER RATE} \right)$$

Attribution Study Methodology

General Approach



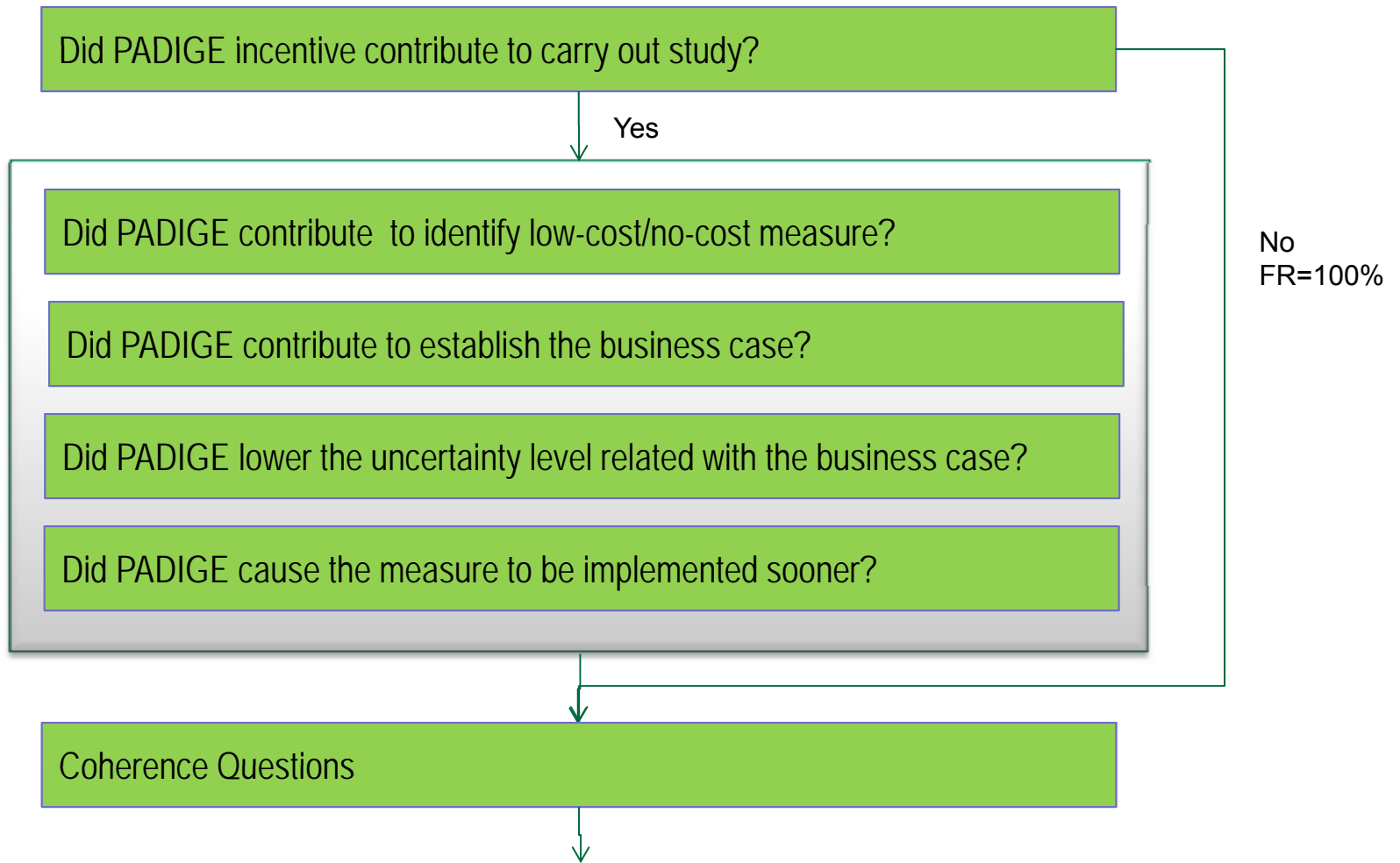
Characteristics of the Methodology

- Self-reporting attribution questionnaire
- Sampling:
 - quasi-census,
 - more than one respondent for each project/measure when possible.
- Respondents would answer for each measure
- Internet-based questionnaire
- Link to questionnaire sent by Hydro-Québec's account managers
- Bias mitigation: confidentiality statement, & third-party researchers
- Dry run of the questionnaire
- Specially-designed analysis algorithm
- More than one attribution pathway
- Bias control questions
- A few in-depth undirected interview(s)

Attribution Study Methodology

Attribution Algorithm (1 of 2)

(Simplified Version)



(A) Freeridership Rate (FR) for the PADIGE Only

Attribution Study Methodology

Attribution Algorithm (2 of 2)

(Simplified Version)

FR for PADIGE Only



Did the extensive engagement and technical assistance by account managers and program engineers cause the measure to be implemented?

Did the Écolectrique Network influence positively the decision to implement?



Coherence Questions



(B) FR for PADIGE and other Tactics

Results and Interpretation

Rate of Response

Item	Population (p)	Response Rate (n)
Number of PADIGE Analyses	20	18
Low-cost/Low-Payback Energy Conservation Measures	42	40
Energy Savings (MWh)	841,312	832,741

Results and Interpretation

Net Savings

Causality Link	Freeridership Rate (FR)	Net-to-Gross Ratio (NTG)
(A) FR PADIGE Only	5.2%	94.9%
(B) FR PADIGE and Other Tactics	0.6%	99.4%

Note: $NTG = 1 - FR$.

- Net Impact Attributed to Hydro-Québec: 836 GWh
- The difference between the two algorithms (1 and 2) represented 38.7 GWh

Results and Interpretation

Conclusions of the PADIGE Attribution Study

- NTG ratio is 94.9% if accounting for PADIGE only, and 99.4% if accounting for all program tactics
- Direct engagement, technical assistance, account management and the Écolectrique Network contributed to strengthening the causality (as per program theory)
- Methodology compliant with the best practices, yet adapted to the specific circumstances of PADIGE
- Report filed with the *Régie de l'Énergie*
- Full report (in French):

Hydro-Québec & ICF Marbek, *Étude d'attribution des économies d'électricité au programme d'analyse et de démonstrations industrielles – Grandes entreprises*, January 2012, available at : http://www.regie-energie.qc.ca/audiences/Suivis/SuiviD-2011-028_PADIGE/HQD_ProgrammePadige_27fev12.pdf

Results and Interpretation

Lessons Learned During the PADIGE Attribution Study

- **Successes:**
 - Customized methodology
 - Internet-based questionnaire: easy and flexible for busy respondents in the industrial sector
- **Caveats:**
 - Tracking down contact people
 - Tracking down more than one person for each measure
 - Self-reporting many years after the fact
 - Lack of clear indication of negative or positive biases of respondents with regard to Hydro-Québec

Program Implementation Implications

According to ICF Marbek

- Mitigation of the Evaluation Lag Risk
 - Better handshake between evaluation and tracking
 - Fast attribution questionnaire
 - Deemed net-to-gross ratio
- Attribution is Effectiveness
 - Importance of deepening the understanding of the decision-making process of each participant
 - Importance of a multi-faceted approach because multiple tactics will strengthen the attribution
 - Importance of documenting the program theory in the form of a logic model



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