

Green OAT

Impact evaluation of the Tax Credit for Energy Transition

November 29th, 2018



The Green OAT Evaluation Council

- In January 2017, France committed to provide three regular reports to investors: an annual report on allocation, an annual report on performance indicators and a report on ex post impacts at an appropriate frequency.
- The Green OAT Evaluation Council is in charge of the 3rd regular report i.e. evaluating the environmental impact of the green eligible expenditure financed by the Green OAT.
- The Council is chaired by Manuel Pulgar-Vidal, former Minister for the Environment in Peru, president of COP20 and WWF Global Climate and Energy Practice Leader. Its members are eight independent experts of green finance and policy evaluation.
- The Secretariat of the Council is provided jointly by the General Commission for Sustainable Development and the Directorate General of the Treasury.



Council members during the first meeting of the Green OAT Evaluation Council on 11 December 2017 in the presence of Brune Poirson, Minister of State attached to the Ministre d'État, Minister for Ecological and Inclusive Transition.

The Tax Credit for Energy Transition (CITE)

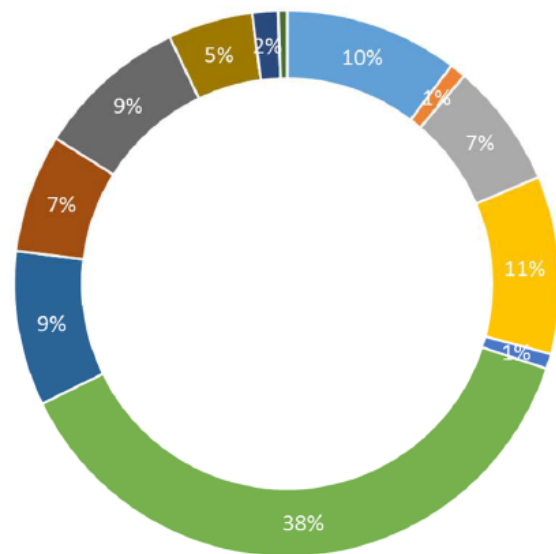
- The Tax Credit for Energy Transition (*Crédit d'impôt pour la transition énergétique* – CITE) is an income tax credit on housing energy efficiency expenditures and on some renewable energy investments.
- The CITE was designed to support the government's objectives regarding energy efficiency and greenhouse gas emissions. Building renovation is indeed a key pillar of this strategy, as buildings account for 45 % of final energy consumption in France and produce 20% of the country's greenhouse gas emissions. In addition, the Building Energy Renovation Plan, published in 2018, sets as a target a 15 % decrease of energy consumption of buildings between 2017 and 2022.
- The CITE represents one third of the green eligible expenditures funded by the proceeds from the initial issuance and the tap issues of the Green OAT in 2017 (3,2 billion euros). This is the largest green eligible expenditure among expenditures selected for the 2017 issuance of the French sovereign green bond.
- In 2016, there was 1.3 million beneficiaries of the tax credit.

Description of the CITE

- **Eligible investments and equipments :**
 - Replacement of heating systems and heating control systems → 11 %
 - Insulation (walls, floor, ceiling, roof, windows, doors) → 73 %
 - Renewable energy production equipment (hot water production, heat pump, electricity supply) → 16 %
- **Budgetary cost :**

Renovation year (model year)	2015	2016
Observed public budgetary cost year	2016	2017
Observed public budgetary cost (billion euros)	1.67	1.68

2016 expenditure breakdown



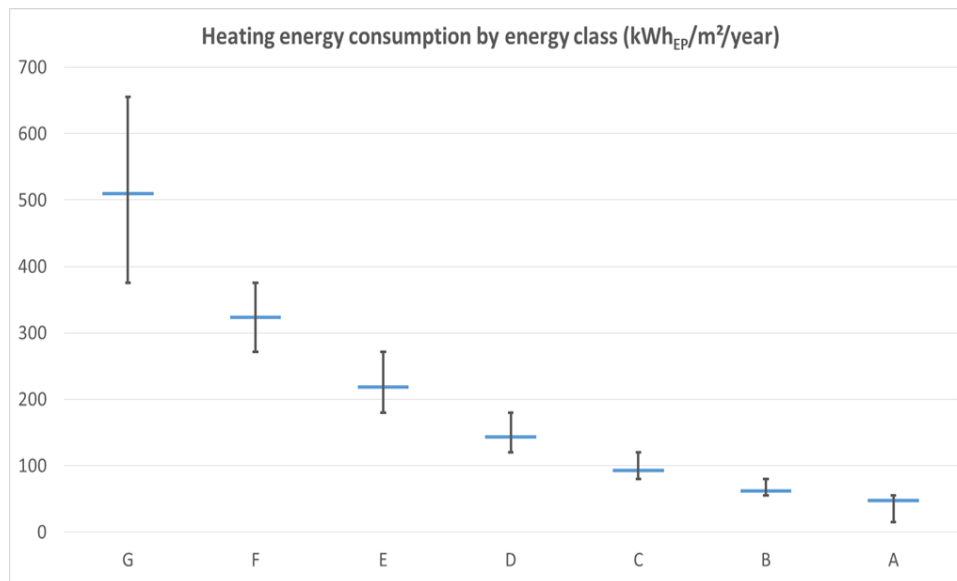
- High energy performance boiler
- Heating control systems
- Thermal insulation material of walls
- Thermal insulation material of roof
- Thermal insulation material of floor and ceiling
- Thermal insulation material for windows
- Insulating shutters
- Entrance door to the outside
- wood heating appliances
- Heat pump
- Heating or hot water production equipment (solar or hydraulic energy)
- other expenditures

Description of the Res-IRF model : initial state of the housing stock

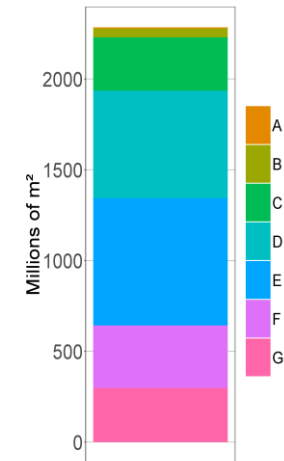
Res-IRF model is based on a description of the energy performance of the housing stock

In France, the DPE (energy performance diagnosis) is used to assess the energy efficiency of dwellings

7 energy classes defined by a range of consumption

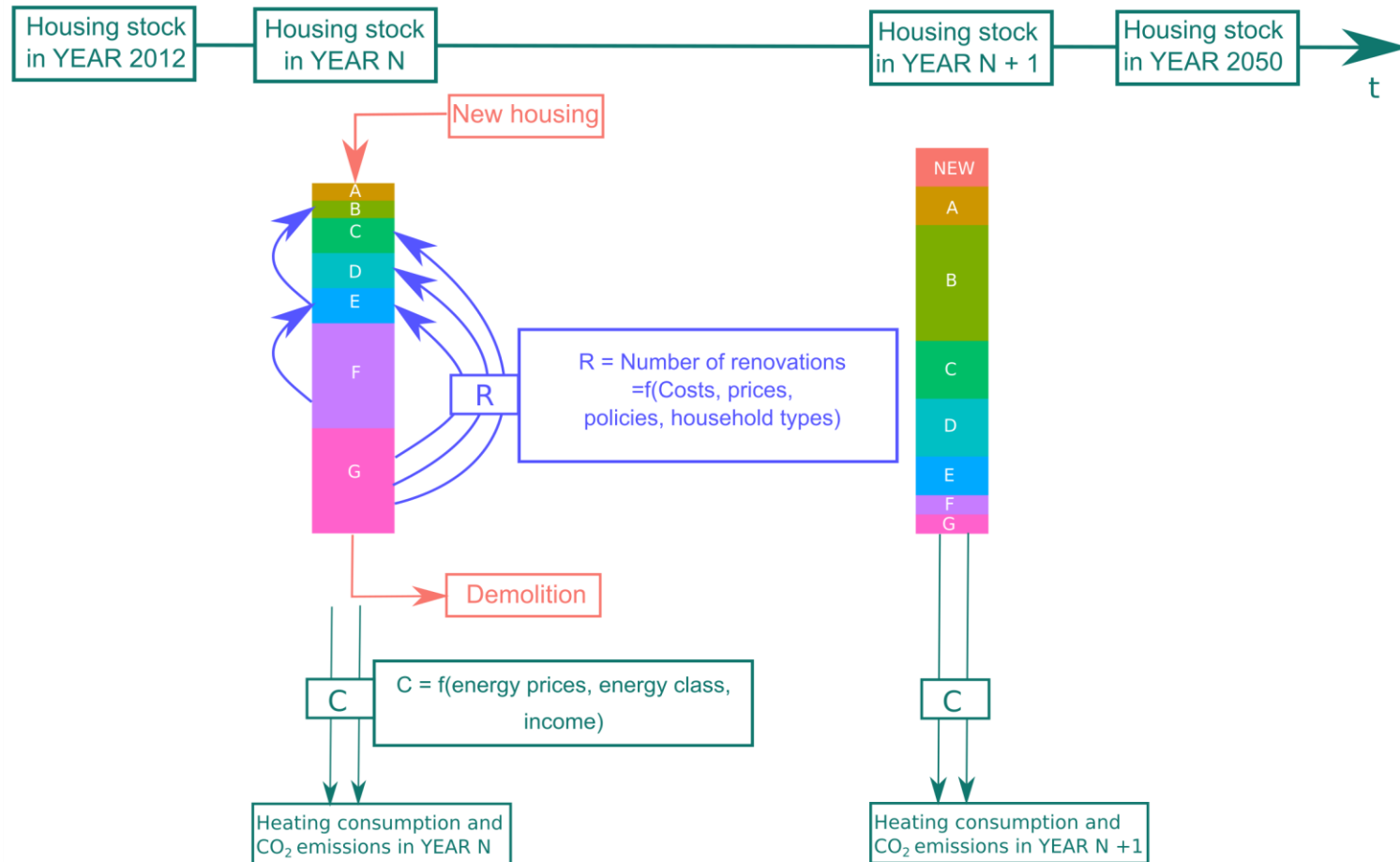


Initial housing stock by energy performance class in 2012 (Phébus survey)



Energy class only gives theoretical energy performance which differs from actual consumption

Description of the Res-IRF model : Housing stock dynamics



Evaluation process

- The CITE assessment was framed by Terms of Reference, defined by the Council with the support of the Secretariat.
 - ❖ *Terms of Reference are available on the AFT website.*
- Two referees, Philippe Quirion and Louis-Gaëtan Giraudet, were appointed in order to monitor closely the evaluation process.
 - ❖ *Philippe Quirion is a senior researcher, in the area of environmental and climate economics. He has published several papers in peer-reviewed journals on energy transition. He is research director at the CNRS, CIREN (Centre international de recherche sur l'environnement et le Développement), and currently advising PhDs on energy efficiency in building renovation.*
 - ❖ *Louis-Gaëtan Giraudet has a PhD thesis in the field of the development of usage of electricity and energy efficiency. He is research fellow at Ecole des Ponts ParisTech, CIREN. He is an expert in energy efficiency policy and energy modeling, especially in housing renovation.*
- An intermediary report has been presented to the Council and submitted to its review and comments.
- The impact assessment study has been conducted by the Commissariat General for Sustainable Development.



Evaluation method

- **Energy savings are estimated by a simulation model.**
 - ❖ *Micro ex-post data from surveys are used in order to calibrate the model as closely as possible to actual households' behaviour.*
 - ❖ *The model is calibrated on the French housing stock in 2012. Output includes the heating energy consumption and greenhouse gas emissions of French dwellings between 2012 and 2050.*
 - ❖ *The model simulates the French households' retrofitting decisions and heating system choices based on renovation costs and exogenous energy prices scenario. "Rebound effect" is taken into account, in order to avoid overestimating energy savings.*
- **The model simulates the impact of public policies on the energy efficiency of French dwellings by integrating the effect of these policies on households' choices through reducing renovation costs (subsidies, loans with reduced interest rate...) and increasing energy prices (carbon tax). It also integrates the effect of thermal regulations on the new housing stock.**
- **To assess the effect of the CITE on energy efficiency investment, heating consumption and GHG emissions, two simulations are compared (with the CITE during 2015 and 2016 and without the CITE), all other things being equal. Since benefits from renovation are grasped for many years after the initial investment, effects of the CITE are assessed until 2050 in both scenarios.**

Main findings of the impact evaluation study

- The CITE triggers around 75 000 additional renovations per year in 2015 and 2016.
 - ❖ *This represents an increase of about 11% of the number of renovations performed.*
- The CITE triggers an additional amount of 1.7 billion euros of energy efficiency investments per year in 2015 and 2016.
 - ❖ *This represents an increase of about 16% of the amount of energy efficiency investment.*
- The CITE reduces energy consumption and CO2 emissions respectively by about 0.9 TWh and 0.12 MtCO2 per year in 2015 and 2016.
 - ❖ *This corresponds to 0.3% of the heating energy consumption and 0.3% of the CO2 emissions of the housing sector in 2015 and 2016.*
- Over the 2015-2050 period, 2.9 MtCO2 and 43 TWh of energy consumption are avoided.
- The cumulative gain of CO2 emissions over 2015-2050 triggered by additional 2015 and 2016 investments corresponds to 7% of the 2015 level of CO2 emissions of the housing sector.



Key elements of the Council's opinion

- The Green OAT Evaluation Council welcomes the evaluation provided, notably the quantitative estimation of the contribution of the Tax credit for energy transition to climate change mitigation.
- The Evaluation Council underlines the high quality of the evaluation process. The study meets high academic standards. The supervision of referees guarantees its independence and quality. Having conducted this first impact evaluation, the Council points out the importance of anchoring this process in the long run and to allow it the time it needs in order to conduct proper impact evaluations.
- The Green OAT Evaluation Council endorses the main results of the evaluation of the Tax credit for energy transition, in particular that this policy contributes significantly to meet Frances' objectives in terms of climate change mitigation.

