SONAE SIERRA
INSIGHTS

SUSTAINABILITY INVESTMENT IMPACT
RESEARCH ASSESSMENT

MAY 2020

CONTENTS

“ *we decided to launch a study, seeking statistical evidence of a relation between sustainability investments and reductions in common charges* ”

01.

EXECUTIVE SUMMARY

This study searched for statistical evidence of a relation between the investments in water and energy efficiency measures and the reductions in common charges.

We also identified external factors that might impact energy and water consumption costs, causing deviation from expected savings, to better understand the investment results.

Finally, we developed a model to forecast *how consumption might evolve if no investment was carried out.*

MAIN FINDINGS

1#

INVESTMENT REDUCES CONSUMPTION COSTS, BUT THIS REDUCTION IS NOT NECESSARILY PASSED ON TO TENANTS.

Although there is a reduction in energy and/or water consumption costs, only in 8 out of 20 cases the common charges[1] were reduced.

2#

ENERGY REPRESENTS UP TO 20% OF TOTAL SERVICE CHARGES[2]; SAVINGS IMPACT CUSTOMER SATISFACTION LEVELS

the correlation between energy and water savings and customer satisfaction is strong (75%) although its connection to tenant satisfaction is lower (19%).

3#

SAVINGS IMPACTED BY EXTERNAL FACTORS

such as management decisions, climate variation, supplier charges and external events.

4#

WITHOUT INVESTMENTS LANDLORD RENTAL INCOME WILL DECREASE TO MAINTAIN AFFORDABILITY RATES[3].

With no investment in sustainable actions owners would lose about 4% in rents if the decision was to not increase tenants' service charges.

(1) common charges: Costs paid by tenants to support the centre management costs: administrative, technical and management fees.

(2) services charges: Costs paid by tenants to support the centre management costs, including common charges and promotion fund.

(3) affordability rates: Occupancy cost ratio, measures the cost weight of occupying a unit over the total sales

$(AffordabilityRate\ (\%) = \%\ ^{(FixedRent\ +\ TurnoverRent\ +\ ServicesCharges)}/_{Sales})$

INTRODUCTION

02.

In recent years, we have carried out several infrastructure investments with the aim of making our properties more sustainable and efficient. These actions are expected to not only have a positive impact on consumption, but also on our tenants, through the reduction of common charges. The goal is also to increase the satisfaction levels of both tenants and visitors.

As a follow up, we decided to launch a study, seeking statistical evidence of a relation between these investments and reductions in common charges. We also identified external factors that might impact consumption costs, causing deviation from expected savings, to better understand the investment results.

Finally, we developed a model to forecast how consumption might evolve if no investment was carried out.

This helps us pursue greater efficiency, and forecast how landlord income is affected when the goal is to keep the tenant's affordability rate at sustainable levels.

With this approach, we were able to confirm the importance of investing in efficiency measures, and how the impact on future income can be critical for tenants and to landlords that can't increase income from rents.

" *we developed a model to forecast how landlord income is affected when the goal is to keep the tenant's affordability rate at sustainable levels.* "

03.

To determine if there is a real connection between sustainability investments and common charges, we compared investment values, consumption savings and savings to common charges.

We also wanted to identify where the cost savings were allocated and how they impacted customer satisfaction. A cost centre audit enabled us to correlate this with the satisfaction index of customers and tenants.

To complement the analysis, in-depth interviews with management teams were essential to identify other external factors or management decisions that could have impacted cost savings.

In order to forecast outcomes in the absence of investment, several models were created and tested using seasonality and key statistical tools, such as correlation and regression.

All data used was collected from internal systems and regular research among customers and tenants.

"*We also wanted to identify where the cost savings were allocated and how they impacted customer satisfaction. A cost centre audit enabled us to correlate this with the satisfaction index of customers and tenants.*"

04.

The sample was created from investment actions that were considered to have a significative impact on consumption, and included 10 shopping centres from the Sonae Sierra portfolio (6 from Portugal, 3 from Spain and 1 from Germany).

From the 27 actions identified (between 2015 to 2017), data normalisation was applied to aggregate by year and by shopping centre, as some assets were subject to more than one investment. Overall, the sample decreased to 20 actions, 16 in the field of energy, and 4 for water.

05.

1# INVESTMENT REDUCES CONSUMPTION COSTS, BUT IS NOT NECESSARILY PASSED ON TO TENANTS

• There is no statistical evidence of causality between sustainability investments and the reduction of common charges. In only 8 out of 20 cases were charges reduced, despite the investments having an effective impact on consumption (16 out of 20 cases). *(see table)* ⟶

ACTION	SHOPPING CENTRE	COMMON CHARGES (Y1-Y0)	SAVING WEIGHT
E1	SC 1	81,581€	-2.40%
E1	SC 3	11,618€	-0.10%
E1	SC 4	-4,125€	-0.20%
E1	SC 6	-330,694€	-5.40%
E1	SC 8	-17,996€	-1.00%
E1	SC 9	67,803€	3.10%
E1	SC 10	19,450€	0.80%
E2	SC 2	45,606€	1.10%
E2	SC 3	-89,020€	-1.00%
E2	SC 4	2,913€	0.20%
E2	SC 6	-89,544€	-1.50%
E2	SC 7	-443,143€	-17.30%
E2	SC 10	-9,045€	0.40%
E3	SC 2	-80,823€	2.00%
E3	SC 5	27,490€	1.10%
E3	SC 10	-45,226€	1.80%
W1	SC 2	-2,550€	-0.10%
W1	SC 3	-11,618€	0.10%
W1	SC 8	54,363€	2.90%
W1	SC 9	67,803€	3.10%
TOTAL		**-613,380€**	**-2.30%**

• The expected savings represent a reduction of 6pp in total consumption, while the real savings represent a reduction of 6.7pp. This translates into an achievement of 109%, which rises to 139% where the 4 examples of increased consumption are left out. *(see table)* ⟶

• The change in consumption savings weight can have different intensities of reduction: High (>5pp), Moderate (3pp to 5pp) and Low (<3pp). *(see table)* ⟶

• In the last 4 years common charges invoiced to tenants rarely decreased. Increases meanwhile were usually connected to inflation, or expected permanent cost increases (e.g. expansions or refurbishments).

ACTION	SHOPPING CENTRE	ENERGY (KWH) AND WATER (M³) CONSUMPTION SAVINGS (Y1-Y0)	CONSUMPTION SAVING WEIGHT	EXPECTED SAVINGS KWH/M³ (Y1-Y0)	EXPECTED SAVING WEIGHT	DIFFERENCE REAL VS EXPECTED	% ACHIEVEMENT
E1	SC 1	-620,240	-7.3%	-140,042	-1.70%	-480,198	443%
E1	SC 3	-325,820	-2.7%	-562,000	-4.60%	236,180	58%
E1	SC 4	-210,865	-7.3%	-105,535	-3.80%	-96,330	191%
E1	SC 6	-38,527	-0.7%	-70,244	-1.20%	31,717	55%
E1	SC 8	-65,656	-2.3%	-162,820	-5.70%	97,164	40%
E1	SC 9	-290,238	-6.2%	-170,000	-3.70%	-120,238	171%
E1	SC 10	99,622	3.7%	-40,000	-1.50%	139,622	-249%
E2	SC 2	-198,309	-3.7%	-172,000	-3.20%	-26,309	115%
E2	SC 3	-455,129	-3.8%	-352,248	-3.00%	-102,881	129%
E2	SC 4	210,099	8.2%	-241,468	-9.40%	451,567	-87%
E2	SC 6	-206,029	-3.6%	-28,285	-0.50%	-177,744	728%
E2	SC 7	-131,213	-4.6%	-30,000	-1.00%	-101,213	437%
E2	SC 10	-79,567	-2.9%	-51,000	-1.80%	-28,567	156%
E3	SC 2	-80,165	-1.5%	-26,000	-0.50%	-54,165	308%
E3	SC 5	-115,577	-3.2%	-146,062	-4.00%	30,485	79%
E3	SC 10	-133,230	-4.9%	-78,737	-2.90%	-54,493	169%
W1	SC 2	-1,109	-4.4%	-11,856	-47.10%	10,747	9%
W1	SC 3	693	1.7%	-16,632	-40.90%	17,325	-4%
W1	SC 8	2,173	11.1%	-1,474	-7.50%	3,647	-147%
W1	SC 9	-440	-1.8%	-4,000	-16.20%	3,560	11%
TOTAL		**-2,630,526€**	**-6.7%**	**-2,410,403**	**-6.10%**	**-220,123**	**109%**

05.

2# ENERGY REPRESENTS UP TO 20% OF TOTAL SERVICE CHARGES; SAVINGS IMPACT SATISFACTION LEVELS

• The energy weight in total service charges varies between 9% to 18%. Assuming that all other costs are fixed, in order to decrease total service charges by 1pp, it is necessary to decrease energy costs between -5.5pp to -11.3pp. The exact amount depends on the weight in total service charges, equal to common charges + marketing costs. *(see table)*

	SC 1	SC 2	SC 3	SC 4	SC 5	SC 6	SC 7	SC 8	SC 9	SC 10
Energy weight in service charges	18%	12%	11%	14%	13%	9%	15%	12%	15%	11%
pp needed for marginal decrease in service charges (-1pp)	5.5	8.1	9.4	7.4	8	11.3	6.7	8.1	6.8	9.2

• Savings tend to be absorbed in other technical costs (typically security, maintenance and cleaning), marketing or/and administrative costs (particularly taxes). Combined together, these are important services for customers and tenants as they contribute to the shopping centre experience.

• The correlation between energy and water savings and customer satisfaction is strong (75%); although its connection to tenant satisfaction is lower (19%).

3# SAVINGS IMPACTED BY EXTERNAL FACTORS

• External factors can affect consumption and are tricky to measure. These include management decisions, climate variation, supplier changes and external events.

• The elasticity of savings is lower where high-impact changes have already been implemented, as the margin for improvement is lower.

4# LANDLORD RENTAL INCOME WILL DECREASE WITHOUT INVESTMENTS TO MAINTAIN AFFORDABILITY RATES

• Gross Lettable Area (GLA), visits, sales, vehicles and climate variables such as rain and temperature are important indicators to calculate future consumption as they are strongly correlated.

• Other common charge elements absorbed the consumption savings of 2,631,844 kWh (290,889€), while forecasts for energy consumption in the absence of investment rose 17,436,595 kWh (about 1,893,478€).

• This figure represents an increase of +3% in service charges paid by tenants, assuming no other item was likely to decrease in compensation, tenants will have to pay more.

• Owners would lose about 4% in rents (+1pp considering the value of extra-discounts given in the period under analysis) if the decision was taken to not increase tenants' service charges to maintain the average tenants affordability rate in each shopping centre.

MOVING FORWARD

06.

HOW CAN THE SHOPPING CENTRE BENEFIT?

Efficiency investments play a key role in shopping centre operations due to the long-term impact they have on landlord incomes. However, not every kind of intervention guarantees a reduction in consumption, as sometimes external events impact the expected savings.

• A centre's investments should be promoted as an efficiency strategy to achieve savings. This helps maintain high levels of customer and tenants satisfaction.

• The monitoring of external factors can help with calculations of the difference between expected savings and real values.

• It is also important to classify investment types by their expected impact on costs, as there are different intensities of savings. Investments exchanging older technology have a higher impact, whereas the savings intensity is marginal when the shopping centre is already more efficient in terms of energy or water.

With this approach to data governance, owners can start to assess the real impact of investments.

"Efficiency investments play a key role in shopping centre operations due to the long-term impact they have on landlord incomes. However, not every kind of intervention guarantees a reduction in consumption, as sometimes external events impact the expected savings."

07.

The purpose of the model was to explore tools that would help forecast consumption values, in the absence of investment or action. The approach was exploratory, assuming that an evolution in consumption would follow the same evolution of other key variables. It enabled us to create algorithms that combine the data with independent prediction variables.

This simple approach doesn't isolate other possible explanations, from external factors to internal aspects, that could have impacted the selected variables.

It is also essentially a conceptual approach, largely skipping historical impacts, and leaving out a qualitative factor to measure the strength of the impact according to its type.

In order to model the data, select shopping centres were used as pilots, with several methodologies applied. We combined benchmarks, correlations and seasonality analysis to understand annual energy consumption, and regression models (simple and multivariable)

to identify the most robust model for predicting consumption variations.

The variables used in the test were: Energy kWh, Water m³, Visits, Sales €, Sales sqm €, Nr Investments, Vehicles, Annual Average Temperature, Annual Maximum temperature, Annual Minimum temperature, Rain mm, Nr days with rain, Occupancy rate GLA, Consumption per visit and cooling degree days.

YO

Y1 without impact
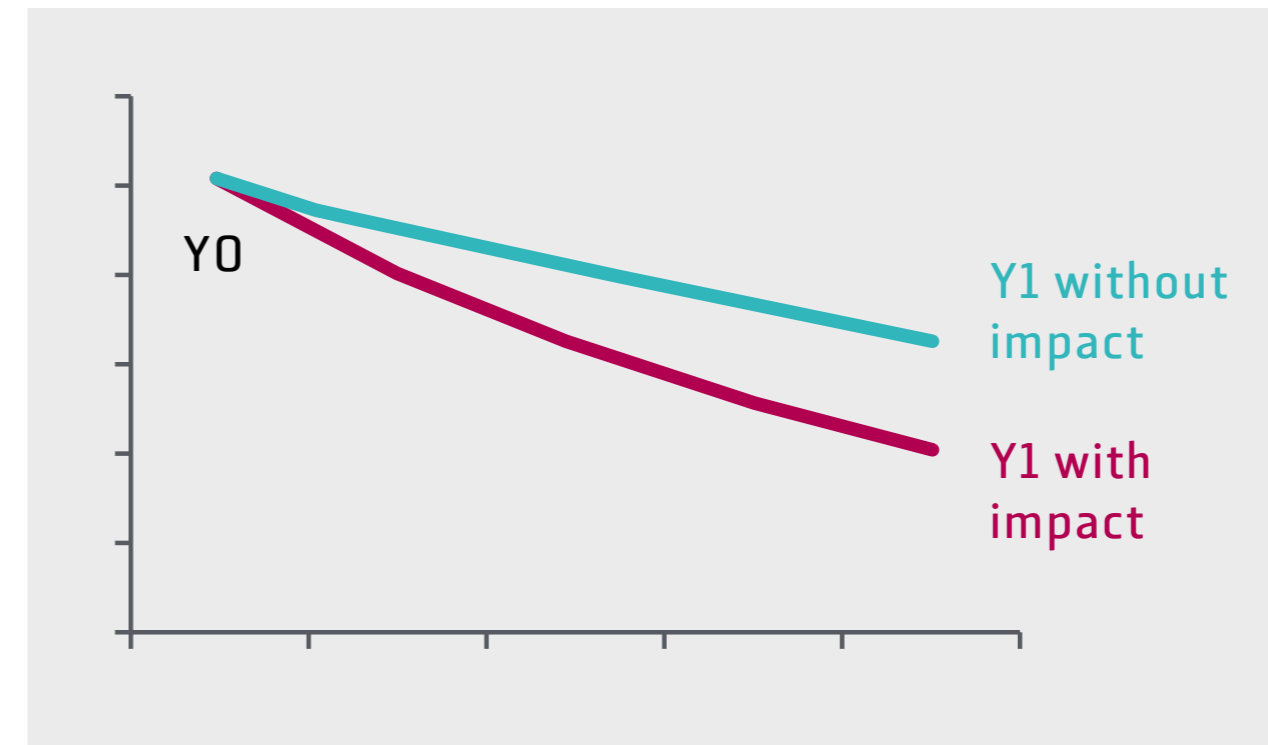
Y1 with impact

$Y1$ without impact $= Y0 * (1+X\%) * (1+Y\%)$

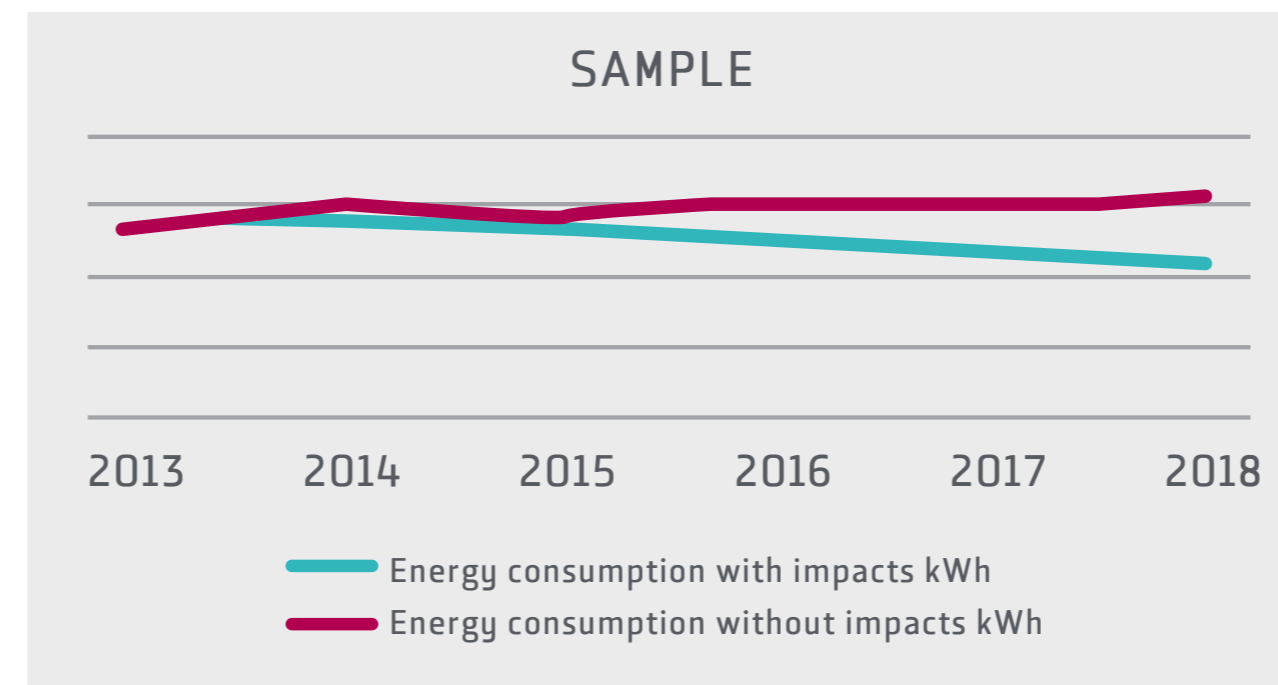Where x% represents the % saving from the type of action

and Y% represents other factors that can be positive or negative.

From the analysis, we found that GLA, Visits, Sales and Vehicles are important indicators to calculate the evolution of consumption as they are strongly correlated.

Seasonality inputs are also relevant both for estimating consumption and fine-tuning impact estimations.

We found that some variables are good predictors on their own, or more successful combined with others. The common variables include performance indicators (visits, vehicles and sales) and climate indicators (rain and number of days with rain).

The model is most effective when it combines all these approaches, as some events might affect the consumption variation.

SAMPLE

| 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |

—— Energy consumption with impacts kWh
—— Energy consumption without impacts kWh

There is a strong positive relationship between GLA or Visits with sales and consumption (energy or water). In the sample analysed, the energy consumption varies between 57 to 103 kWh by sqm, while water varies between 0.22 to 0.58 m³ by sqm. This depends on the centre layout (open air versus closed and number of floors) and the presence of an external garden.

In terms of visits, the energy consumption varies between 1.16 to 2.91 kWh per visit, while water varies between 0.0011 to 0.0051 m³. These indicators can be used to forecast consumption and its evolution.

Seasonality is useful to understand the monthly distribution of consumption values, and estimate costs during the year.

DETAILS ABOUT THE MODEL

07.

The tests made in the sample, to forecast the last quarter of 2018 for energy consumption, showed an average error of +/-3pp, which is low. In future, we can use this to estimate values, assuming that consumption will essentially follow the same seasonal paths as the previous year.

We also looked in-depth at weather indicators, namely Annual Avg Temperature, Annual Max temperature, Annual Min temperature, Rain mm and Nr days with rain.

Using one shopping centre from the sample as example, rain quantity and number of days with rain turned out to be good predictors for energy variations, either individually or combined with visits.

There are three main aspects of energy consumption, with the significance of each defined by its weight in terms of total consumption. That means that the level of impact gained from sustainability investments depends on the energy type being targeted.

08.

TIME:

We can't currently differentiate between positive changes driven by acts of investment from those resulting from operational decisions. Sometimes consumption diminishes not due to action, but because it is surpassed by other events - meaning that cumulative impacts are real.

After actions are implemented, the impact is usually instantaneous. Yet even where equipment is automated, the human factor – and its potential to modify the process – cannot be discounted. This can ultimately increase or decrease consumption levels, meaning that sometimes the real outcome is not 100% correct or diminishes over time.

TYPE OF INVESTMENT AND SAVINGS IMPACT:

There are three main aspects of energy consumption, with the significance of each defined by its weight in terms of total consumption (see table). That means that the level of impact gained from sustainability investments depends on the energy type being targeted.

For example, all actions relating to air conditioning and lighting tend to have a high impact on consumption savings. In the sample under analysis, all investments were distributed by type of action and the majority were classified as high impact.

AVERAGE WEIGHT OF ENERGY CONSUMPTION BY TYPE

AVAC	LIGHTING	ELEVATION & OTHERS
50 to 60	20 to 30	10 to 20

EXTERNAL FACTORS THAT CAN IMPACT CONSUMPTION VARIATIONS

08.

THE SHOPPING CENTRE LIFECYCLE:

Our historical investment plan, applied to our managed shopping centres, is making a real difference in terms of improving equipment efficiency and increasing savings. New opportunities in terms of technology have been adopted in the medium-term as best practice and standard service.

Moving forward, the elasticity of savings is lower where high-impact changes have already been implemented, as the margin for improvement is lower.

However, in terms of technical expenses, we encounter two types of costs. This includes those related to preventive actions, implying mandatory visits from suppliers to check on the equipment.

Other expenses, considered corrective actions, are represented by hourly costs and involve centre management requesting expert visits.

These types of actions are ad-hoc and can positively or negatively affect total costs.

EXTERNAL FACTORS THAT CAN IMPACT CONSUMPTION VARIATIONS

08.

SUPPLIERS AND CLIMATE:

Currently, energy suppliers are chosen yearly, and in some cases, every six months, depending on energy costs and the portfolio size. All other suppliers have longer contracts, usually 3 years. In terms of operations, the focus is on securing the best quality with the lowest price. If, in the past, most services were concentrated in a few suppliers, the increasing offer in the market has encouraged a shift towards better cost management, even if negotiation adds to the work load.

Climate variations such as temperature extremes or rain also affect energy and water consumption.

However, there are initiatives which help decrease consumption, such as channelling external temperatures to decrease internal temperatures, or reusing water that comes from other places such as cooling towers.

Gardening costs are affected by temperature and climate, as more water is needed during high temperatures or a lack of rain.

The number of visits is highly correlated with energy & water consumption in most centres.

When there is an increase in visits, internal temperatures also rise due to human body heat.

So, all events (internal and external) that drive more people to the shopping centre impact the need for cooling, security and maintenance.

> " *Climate variations such as temperature extremes or rain also affect energy and water consumption.* "

ABOUT

SONAE SIERRA

Sonae Sierra is an international real estate company committed to delivering solutions to meet its client ambitions.

With over 30 years' experience in developing, investing and managing retail real estate across four different continents, at Sonae Sierra we have unrivalled expertise and an enviable track record of success behind us.

The sustainability credentials of our real estate assets, and those of our clients, is of the utmost importance to us and we have long been committed to looking at ways to reduce costs and improve efficiency.

If you are looking for the best pathway and bespoke tools to unleash your true sustainable value in real estate assets, uncover sustainable opportunities, improve competitiveness and increase revenue over time, let's get in touch.

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