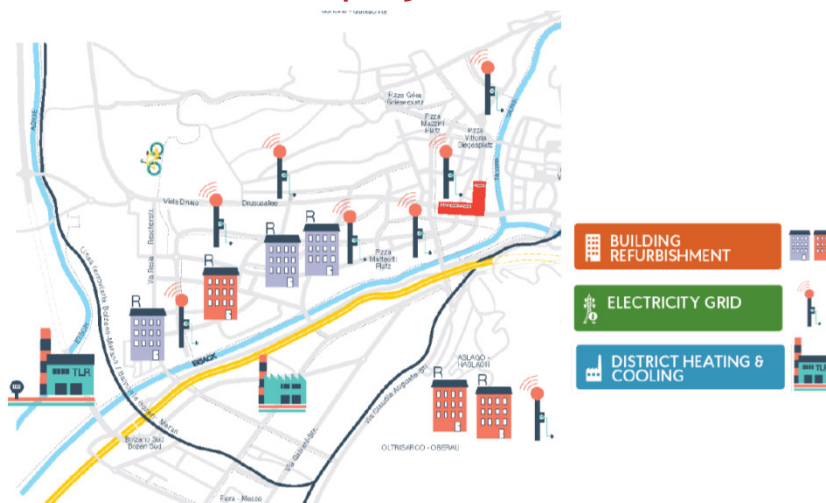




## Single owner building stock management and technical economical analysis

Marco Castagna

## The Sinfonia project





3



Credits: Area Architetti

4

## Renovation strategy

- Step 1 --> Extra costs
- Step 2 --> Overall benefits
- Step 3 --> Building stock



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## Feasibility study on the Plaza building

KlimaHaus D → KlimaHaus B

Renovation cost proposed	2.247.500 €
"Conto energia" incentives	336.000 €
bills savings	18.281 €
Return on investment	105 Years



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## Feasibility study on the Plaza building



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## Step 1 - Feasibility study on the Plaza building

- 2 ways;
- Perform the requalification;
  - Do not perform ~~the~~ requalification;
  - Perform a maintenance intervantion;



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## Step 1 - Detect synergies

- Detect synergies with ordinary and extraordinary maintenance;

Costs



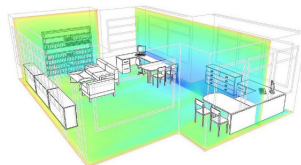
Extra costs



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## Step 2 - Consider all the benefits

- Consider all the benefits of the requalification process:
  - reduction of the bills;
  - reduction or increase of maintenance costs;
  - increase of the value of the buildings;
  - increase of indoor comfort;



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## Step 3 - Planning requalification at the level of building stock

- Planning at the level of building stock, not at the level of building;



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## Development of CERPLAN

We developed a excel tool to plan the energy renovation of a building stock:


- Building Data Sheet - In this file are collected all the necessary information (often stored in different offices);
- A database of Data Sheets - It collects all the buildings and allows to define priorities;



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AUTONOME  
PROVINZ  
BOZEN  
SÜDTIROL



PROVINCIA  
AUTONOMA  
DI BOLZANO  
ALTO ADIGE

26.04.2016


Institute for Renewable Energy

## Building data sheet - building data


- General information;
- Geometric data;
- Envelope data;
- Energy consumption data;
- HVAC information (Heating, cooling, ventilation);
- Lighting information;
- Security systems and communication;
- Accessibility;
- Architectural barriers;
- Renewable energies;

< >
Dati edificio
Calcolo risparmio
Piano economico
flusso di cassa cumulato
+

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AUTONOME  
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26.04.2016

Institute for Renewable Energy

## Building data sheet - Savings estimation

- Control heating systems;
- Insulation opaque surfaces;
- Replacement of windows;
- Solar thermal panels for hot water;
- Photovoltaic solar panels;
- Condensing boiler;
- Heat pump;
- Biomass boiler;
- Refrigeration unit;
- Lighting;
- Replacement of the transformer;
- Maintenance costs;
- Increase of the value of the building;

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Dati edificio
Calcolo risparmio
Piano economico
flusso di cassa cumulato
+

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## Building data sheet - Business plan

### Sintesi output economico con extracosti con incentivi

Valore attuale netto 10 anni (VAN)	-€ 77.807,32
Valore attuale netto 20 anni (VAN)	€ 86.486,67
Valore attuale netto 30 anni (VAN)	€ 262.433,96
Tasso interno di rendimento 10 anni (TIR)	2,79%
Tasso interno di rendimento 20 anni (TIR)	8,87%
Tasso interno di rendimento 30 anni (TIR)	10,40%

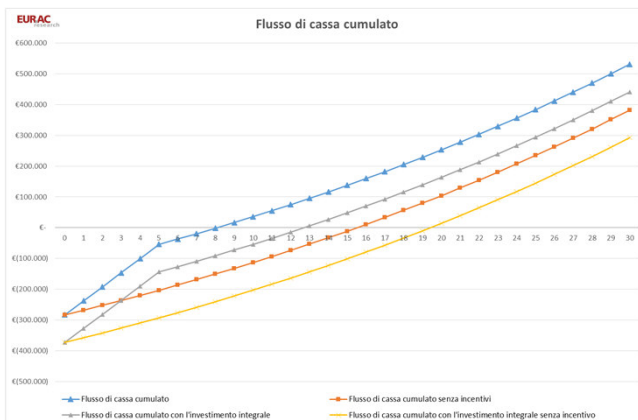
### ESPLOSO OUTPUT ECONOMICO C

Anno	0	1	2	3	4	5	6	7	8	9	10	11
Risparmio economico energia Investire	13.146.224	13.118.724	13.090.884	13.062.584	13.033.824	13.004.604	12.974.924	12.944.784	12.914.184	12.883.124	12.851.604	12.819.624
Risparmio economico energia Impianti	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
Altri oneri interventi sull'investimento	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
Altri oneri interventi sull'impianto	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
Incentivi	29.800.004	29.800.004	29.800.004	29.800.004	29.800.004	29.800.004	29.800.004	29.800.004	29.800.004	29.800.004	29.800.004	29.800.004
Margine operativo lordo	44.946.224	43.918.724	43.790.884	43.652.584	43.503.824	43.344.604	43.174.924	42.994.784	42.804.184	42.603.124	42.391.604	42.169.624
Anno	0	1	2	3	4	5	6	7	8	9	10	11
Rate	1	13	25	37	49	61	73	85	97	109	121	133
Quota Interessi	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
Quota Capitale	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
Rate	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
Anno	0	1	2	3	4	5	6	7	8	9	10	11
RISULTATO ANTE IMPOSTE	44.946.224	43.918.724	43.790.884	43.652.584	43.503.824	43.344.604	43.174.924	42.994.784	42.804.184	42.603.124	42.391.604	42.169.624
FLUSSO DI CASSA	-282.780.004	44.946.224	43.918.724	43.790.884	43.652.584	43.503.824	43.344.604	43.174.924	42.994.784	42.804.184	42.603.124	42.391.604
FLUSSO DI CASSA CUMULATO	-282.780.004	-237.833.784	-192.915.064	-148.124.184	-103.461.364	-58.927.544	-14.612.724	19.592.804	62.587.584	105.391.764	148.004.884	190.416.484
Valore attuale netto (VAN)		-129.704.404	-284.628.124	-241.199.104	-199.690.024	-159.217.104	-119.767.174	-80.438.004	-41.248.004	-2.013.174	77.807.32	86.486.67

Dati edificio Calcolo risparmio Piano economico flusso di cassa cumulato

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## Building data sheet - Business plan



Dati edificio Calcolo risparmio Piano economico flusso di cassa cumulato

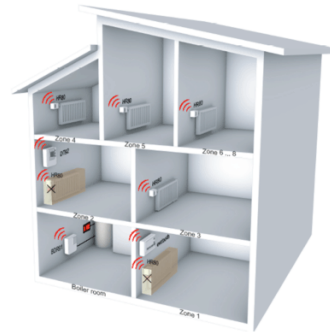
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## Interventions on control of the plants

- Reducing of waste energy
- Return of investment almost zero;



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## Interventions attractive only for the owner

- Return of investment attractive only to the owner;
- Problems of indoor comfort;
- Representation intervention;



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## Interventions attractive for the owner and for an ESCO

- return of investment attractive for ESCO and the owner;



It allows the owner to give the interventions to the ESCO.  
This will maximize the investment achievable.



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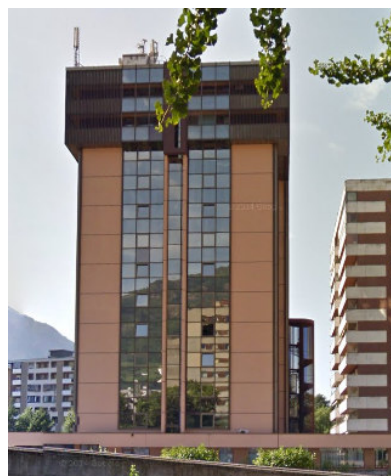
## Feasibility study on the Plaza building

### original proposal

Renovation cost proposed	2.247.500	€
"Conto energia" incentives	336.000	€
bills savings	18.281	€
Return on investment	105	Years

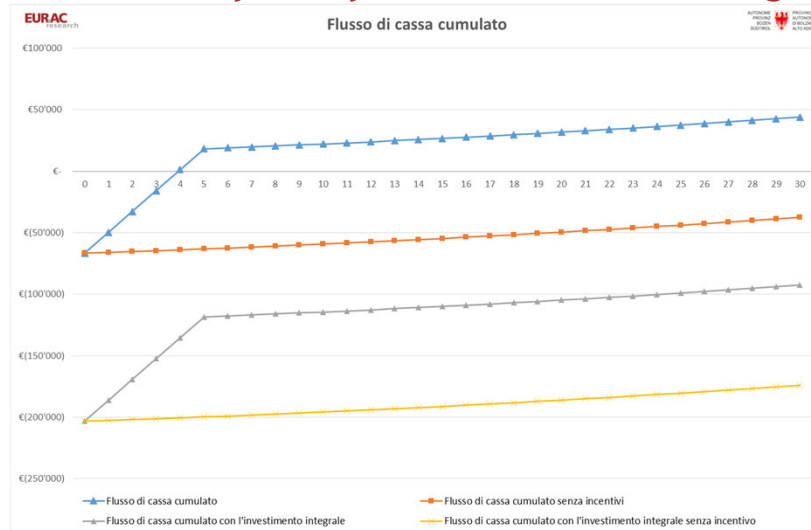
### new proposal

Renovation cost proposed	66.700	€
"Conto energia" incentives	81.300	€
bills savings	670	€
Return on investment	4	Years



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## Feasibility study on the Plaza building



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## Future developments

- Validation in TRNSYS;
- Web database;
- Study intervention in elevators;
- Synergies with seismic requalification of buildings;

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**Thank you**

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[www.eurac.edu](http://www.eurac.edu)