A.

General information regarding the action presented
Bolzano

- Inhabitants: 104,000
- Surface: 5,240 ha
- Settlement area: 900 ha
- Industry: 450 ha
- Agriculture: 1,300 ha
- Forest: 2,600 ha
Context

• Existing framework of energy and mobility plans
• Mobility plan and Master plan of the city
• Several European projects activated and related to:
  • energy efficiency in buildings and stakeholder involvement (EPOURBAN, 3ENcult, BRICKER, COMonENERGY);
  • Reduction of greenhouse gas emissions from transport in urban areas (REZIPE);
  • ICT and sustainable mobility for environmental data management (INTEGREEN);
• Energy planning office in the Municipality
• Sustainable Energy Action Plan (2011-2014)

Source: Forumcommunity, Gem. Bozen, Bilfinger
SUSTAINABLE ENERGY ACTION PLAN

Klimaplan
Alto Adige

1. Buildings
   1.1 District Heating
      1.1.1 Connection to the incinerator (32.8 MWh/year)
   1.2 Energy retrofitting of public buildings
      1.2.1 Offices
      1.2.2 Residential buildings belonging to the Municipality
      1.2.3 Residential buildings belonging to the Social Housing Programme
   1.3 Smart Grid
      1.3.1 Distribution starting from the industrial area

2. Mobility
   2.1 New cycle paths
      2.1.1 15 km of new cycle paths, added to the existing 50 km
   2.2 New public transport system
      2.2.1 New tramway Oltradige
      2.2.2 New tramway connection between the Industrial Area and the city centre
   2.3 Parking
      2.3.1 14 underground parking lots
   2.4 Promotion of electric vehicles (cars and bikes)
   2.5 Reorganization of goods distribution inside the city
      2.5.1 Test attivazione pian di distribuzione organizzata
   2.6 Public lighting

3. Renewables
   3.1 Co-generation
   3.2 Hydropower
   3.3 Renewables

Intelligent use of the energy
Energy efficiency
Substitution of fossil fuels
Renewable energy production

BOZEN. DIE ENERGIEQUELLE.
BOLZANO. FONTE DI ENERGIA.
CO2 EMISSIONS IN BOLZANO (2010)
**FIGURE 32. NUMBER OF BUILDINGS AND TOTAL SURFACE PER EACH CONSUMPTION CATEGORIES**
<table>
<thead>
<tr>
<th>kWh/m² year</th>
<th>mono-bifamily</th>
<th>multifamily small</th>
<th>multifamily big</th>
<th>block</th>
</tr>
</thead>
<tbody>
<tr>
<td>until 1918</td>
<td>168.01</td>
<td>112.64</td>
<td>107.33</td>
<td></td>
</tr>
<tr>
<td>1919-1945</td>
<td>199.95</td>
<td>128.41</td>
<td>116.12</td>
<td>111.89</td>
</tr>
<tr>
<td>1946-1960</td>
<td>159.36</td>
<td>119.31</td>
<td>114.50</td>
<td>114.39</td>
</tr>
<tr>
<td>1961-1970</td>
<td>191.04</td>
<td>129.51</td>
<td>153.61</td>
<td>137.16</td>
</tr>
<tr>
<td>1971-1980</td>
<td>114.05</td>
<td>128.12</td>
<td>173.48</td>
<td>167.49</td>
</tr>
<tr>
<td>1981-1990</td>
<td></td>
<td>120.38</td>
<td>129.27</td>
<td>147.64</td>
</tr>
<tr>
<td>1991-2000</td>
<td>205.78</td>
<td>140.35</td>
<td>110.40</td>
<td>114.30</td>
</tr>
<tr>
<td>2001-2005</td>
<td>104.92</td>
<td>105.82</td>
<td>102.68</td>
<td>100.48</td>
</tr>
<tr>
<td>from 2006</td>
<td>101.56</td>
<td>99.56</td>
<td>98.19</td>
<td>77.37</td>
</tr>
</tbody>
</table>
BREAKDOWN PER BUILDING TYPOLOGY AND CONSTRUCTION PERIOD
FIGURE 33. DISTRIBUTION OF BUILDINGS IN THE EXTENDED DISTRICT OF BOLZANO DIVIDED FOR CONSUMPTION CATEGORIES
SINFONIA PROJECT – FP7 8.8.1 ENERGY SCC

Project submission: OCTOBER 2012
project start: JUNE 2014
# SINFONIA MAIN FIGURES

<table>
<thead>
<tr>
<th>MAIN FIGURES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Budget</strong></td>
<td></td>
</tr>
<tr>
<td>EU</td>
<td>43 Mln Euro</td>
</tr>
<tr>
<td></td>
<td>30 Mln Euro</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>5 years (started 06.2014)</td>
</tr>
<tr>
<td><strong>Partners</strong></td>
<td>23 partners + 10 third parties</td>
</tr>
</tbody>
</table>

### Pilot Cities
At the heart of SINFONIA is a close and long term collaboration between two pioneer cities and five early adopter cities representing a wide variety of regulatory environments and climate zones.

#### SMALL AND MEDIUM SMART CITIES
- Duda
- Innsbruck
- Bolzano
- Rosenheim
- Seville
- Pafos
B.
Rationale for initiating the action
DISTRICT SCALE, Replicability of interventions

To:
• Save up to 40 - 50% primary energy in the DEMO cities;
• Increase the share of Renewable Energy by 20% in the energy consumption

• Building refurbishment;
• Energy network optimization;
• DHC network optimization
Città di Bolzano
Stadt Bozen

Municipality

Innovation Park

Research & Technical Institution

Institute for Social Housing

Local Energy provider

Agency for Energy Efficiency in Buildings

Sinfonia partnership

Bolzano partnership

eurac research

IDMA

IPES

alperia

KlimaHaus

CasaClima
C. Financial aspects
## BOLZANO IMPLEMENTATION VALUES

<table>
<thead>
<tr>
<th>BOLZANO Implementation</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total EC contribution in Bolzano</td>
<td>8 M € (out of 30 M €)</td>
</tr>
<tr>
<td>Total Project value (incl. Cofin)</td>
<td>15 M € (out of 43 M€)</td>
</tr>
<tr>
<td>Total financial allocation in the city</td>
<td>~100 M €</td>
</tr>
</tbody>
</table>
D.
Mechanism of Implementation
ACTIONS in BOLZANO
SOCIAL HOUSING BUILDINGS OF 1950-70ties

- Building envelope insulation;
- Integration of renewable energy sources for electricity, heating and domestic hot water;
- PV panels;
- Additional storeys using innovative timber construction technologies.
Test of the Bonus on Volume Program

Up to 20% of additional volume if an energy retrofit at A class is done
Via Palermo 38+10
Via Similaun 59+10 flats
Example of applied measures – external insulation

• Different types of façade refurbishment are applied
• In some buildings prefabricated façade elements are used in order to reduce intervention time on site
Example of applied measures –

[Image of prefabricated components diagram]
Example of applied technologies

Via Palermo - 38 +10 alloggi

Mechanical Ventilation scheme
Example of applied measures – “bonus on volume”
Large scale monitoring system and data acquisition
170 apartments

✓ Better building energy management
✓ Direct feedback to tenants
✓ Tenant awareness and participation
Example - Via Parma

**Actual situation:**
- Casaclima G
  - (186 kWh/m²y)
- 77 flats

**After refurbishment:**
- Casaclima A
  - (18 kWh/m²y)
- 77 + 16 additional flats

Comune di Bolzano
Example - Via Aslago

Actual situation:
• Casaclima G
  (228 kWh/m²y)
• 70 flats

After refurbishment:
• Casaclima A
  (21 kWh/m²y)
• 70 + 14 additional flats

Comune di Bolzano
Via Palermo
Via Similaun
Via Parma

Comune di Bolzano. M7 Architecture – Marco Sette architetto
Via Aslago
FINANCIAL FIGURES ON BUILDING REFURBISHMENT

Comune of Bolzano:

• Investment for refurbishment: ~ 450 – 500 €/m²

• Investment for additional floor: ~ 1500 €/m²

=> Reference price for new buildings of the Province of Bolzano: 1420 €/m²

IPES:

• Investment per flat: ~ 45,000 €
SMART STRATEGIES ICT

URBAN PLANNING USING IOT

- Network Coverage
- Traffic
- Environment
- Pollution
- Noise
URBAN SERVICE-ORIENTED SENSIBLE GRID (USOS-GRID)

- Recharge points for vehicles and bicycles;
- Meteorological stations for local climate condition monitoring;
- Smart retrofitting of the public lighting system.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart points</td>
<td>150</td>
</tr>
<tr>
<td>Different services</td>
<td>6</td>
</tr>
<tr>
<td>Citizens involved</td>
<td>50,000</td>
</tr>
</tbody>
</table>

- **Strategic and operational financial savings** though the scale of energy savings;
- **Re-use** and exploitation of **existing assets** through focus application;
- **Energy saving** potential through LED and smart lighten systems installation (50-75%);
- **GHG emissions reduction** by better traffic/parking management and provision of the charging services to sustainable means of transport;
- High scalability and **replicability** potential;
- General city ICT data collection network **optimization**, data management and services provision

Source: EURAC
MOBILITY: AIR QUALITY

Map with the Air Quality provided by CISMA

ELECTRICITY GRID

Sinfonia a Bolzano
MICROCLIMATE: WEATHER CLUSTERS

Weather conditions: homogeneous clusters for microclimate (15 classes)
SECURITY

Total level of security

Legend
- High: 368,328
- Low: 3,65401

ELECTRICITY GRID
INFO/SERVICES TO CITIZENS

Density analysis; Info displays for pedestrians

Density weighted analysis of:
- schools (with internal weights),
- bars/restaurants, stores (>= 50 workers),
- theaters/museums, parking (no hospital and >= 150 places),
- stations (bus and train),
- principal squares
Examples of smart point/services

“Totem Urban Area”
- Optic fiber connection;
- Electricity connection;
- Integration of the electricity connection with the separated PV module integrated in the roof
- display touch
- Light art
- Smartphone charger USB, cables, inductive charging
- NFC reader
- Webcam
- Microphone

“Totem green areas”
- Optic fiber connection;
- Electricity connection;
- Light;
- SOS point;
- Display touch;
- wi-fi,
- cell phone charger,
- webcam,
- NFC
- Water source
- Microphone
Examples of smart point/services

“Totem Parking area (Optional)”
- Optic fiber,
- Electricity connection
- EV charger
- Wi-fi
- Webcam
- Display
- Camera for the parking lots availability monitoring

Diffused sensors
- Air quality monitoring
- Traffic information panels
- Bluetooth car trackers
- Bicycle trackers
- Safety cameras
- Smart lighting systems
Bolzano – district heating
Bolzano – waste incineration
Thermal energy storage

• Thermal energy storage under construction by Alperia

• To serve as buffer between waste incineration production and the city consumption
New city quarter to be connected applying lower temperatures

Hospital to be connected for heating & cooling via sorption chillers
THE DISTRICT & COOLING NETWORK EXTENDED AND OPTIMISED

- Real time monitoring and forecasting of peak loads and energy demand;
- Hybrid hydrogen/methane backup system;
- Feasibility study for recovery of wasted energy in the local industrial park.

Expected reduction of

- CO2eq up to 30%
- NOx up to 60%
www.sinfonia-smartcities.eu
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Board Member - International Society Of City And Regional Planners (ISOCARP)

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