



CitInES

City and Industry Energy Strategy

CitInES
City and Industry
Energy Strategy

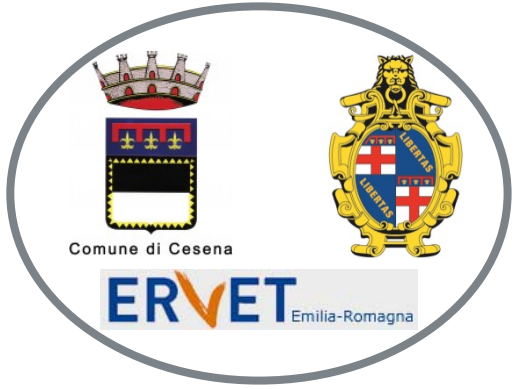


Daniele Basciotti
AIT Austrian Institute of Technology, Energy Department

Smart City Exhibition - Bologna, October 31. 2012

CitInES consortium

- **European funding (FP7 project)**
- **Pilot end users**
 - Local authorities : cities of Cesena and Bologna
 - Industry : Tupras oil refinery (Turkey)
- **Time line**
 - Oct 2011: project start
 - May 2013 : software on site experimentation



2 cities

1 SME



4 research centers



2 industrial groups



Motivation



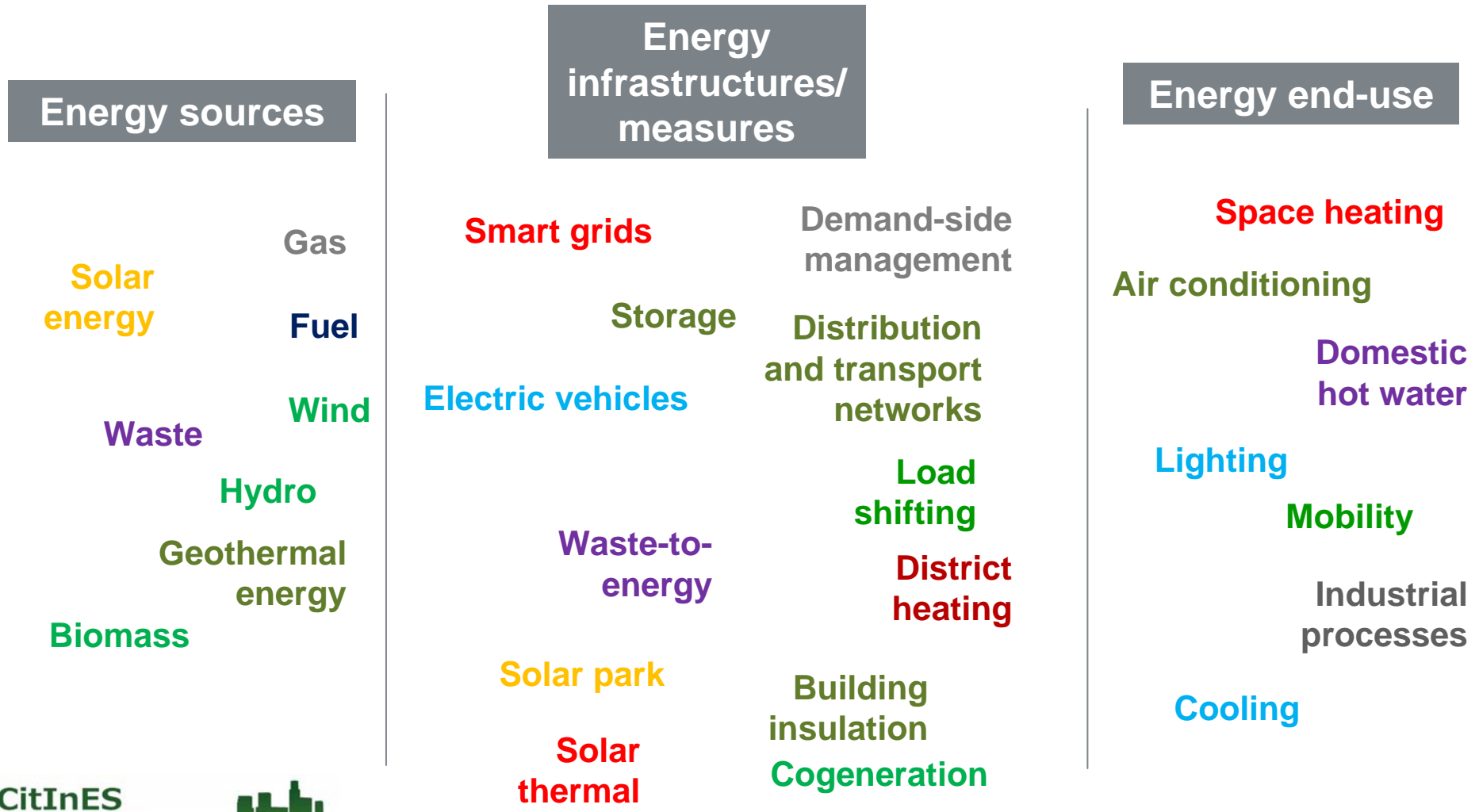
According to OECD:

- 67% of world energy is consumed by cities
- 70% of CO₂ emissions come from cities

=> Optimizing energy investments in cities is a key challenge to reduce CO₂ emissions



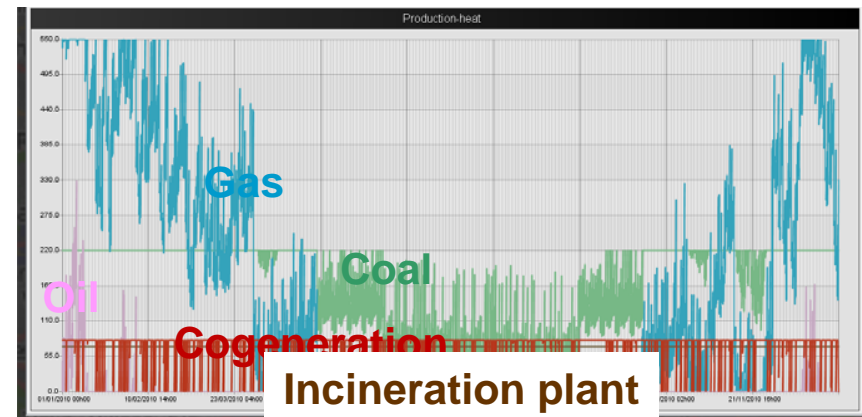
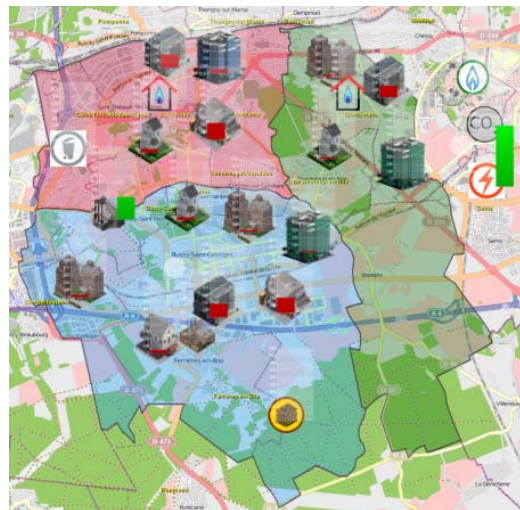
Many energy solutions: which one is the most adapted?



CitInES objectives

A decision-support tool to help local authorities to optimize energy investments

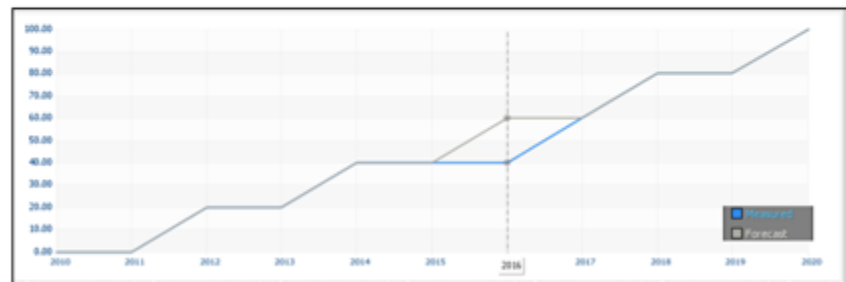
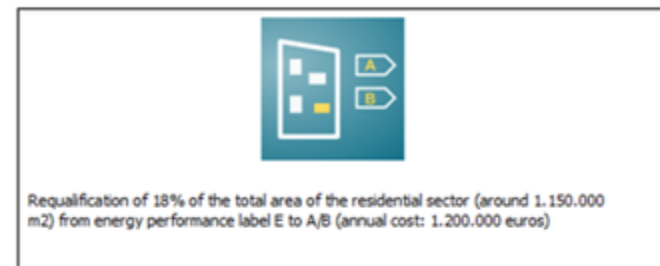
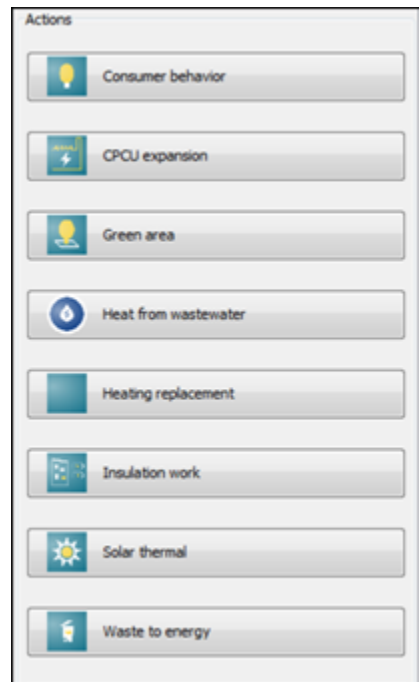
- Simulate, assess and compare **urban energy strategies**
- Optimize local energy strategy to **cost-effectively** reduce CO2 emissions
- Define robust energy schemes to face **fuel price uncertainties**



CitInES objectives

A communication/monitoring tool to

- Monitor the **degree of success** of the planned measures (e.g. SEAP)
- **Facilitate** communication between stakeholders
- **Report and promote** local authority decisions towards citizens



CitInES objectives

A detailed representation of the urban energy system

- Energy end-use in buildings, transport, urban facilities and industries
- Energy generation, distribution and storage
- Investments and operational costs

Framework conditions:

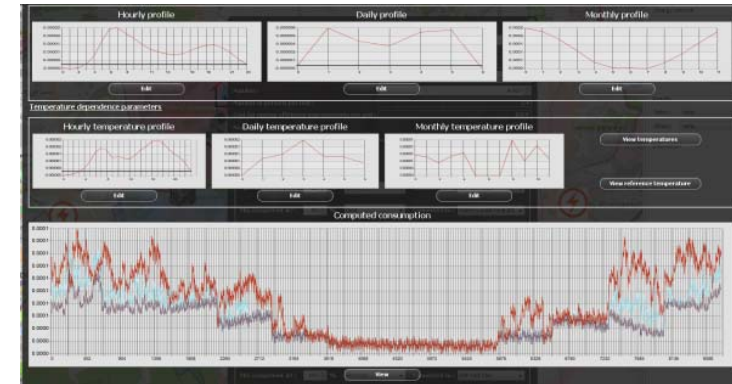
- Long-term fuel price scenarios for risk analysis



CitInES: a modular tool with database

Different input/output levels of detail:

- Annual profiles for consumption / production
- Hourly profiles for consumption / production



→ Available measurements used to further calibrate profiles

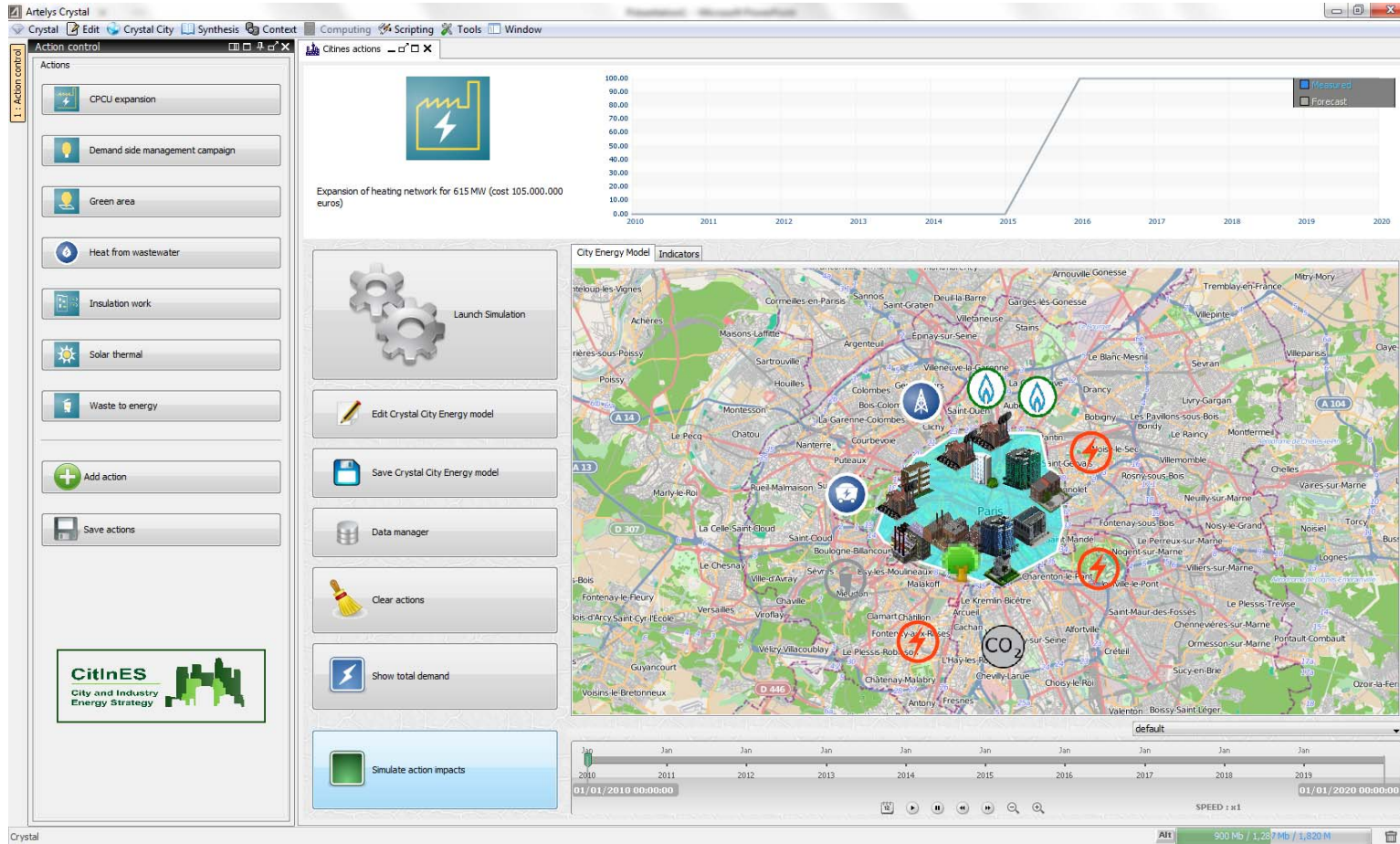
Comprehensive database:

- Profile by type of consumer and end-use
- Energy production and storage assets (with corresponding costs)
- Main structures of supply contracts and market price scenarios
- Climatic and production risks (outage) models
- Long-term consumption evolution and fuel price scenarios



CitInES: user interface

User interface



The screenshot displays the CitInES user interface within the Artelys Crystal software. The interface is organized into several key sections:

- Left Panel (Actions):** A vertical list of action buttons including CPU expansion, Demand side management campaign, Green area, Heat from wastewater, Insulation work, Solar thermal, Waste to energy, Add action, and Save actions.
- Top Center:** A line graph showing the expansion of a heating network for 615 MW (cost 105,000,000 euros) from 2010 to 2020. The graph shows a sharp increase starting in 2015, reaching 100.00 by 2016 and remaining constant thereafter. A legend indicates 'Required' (blue) and 'Forecast' (grey).
- Bottom Center:** A 3D map of Paris with a city energy model overlay. The model shows buildings and infrastructure with various energy indicators. A CO₂ icon is visible on the map. A timeline at the bottom of the map shows the simulation period from 2010 to 2020.
- Right Panel (Simulation Controls):** A vertical stack of buttons for simulation management: Launch Simulation, Edit Crystal City Energy model, Save Crystal City Energy model, Data manager, Clear actions, Show total demand, and Simulate action impacts.

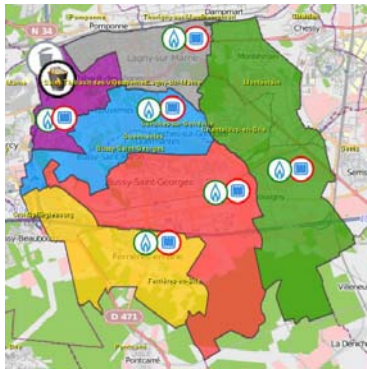


CitInES: application example

Reference scenario

- Heating from gas & electricity
- Electricity from incineration plant
- Import from national grid

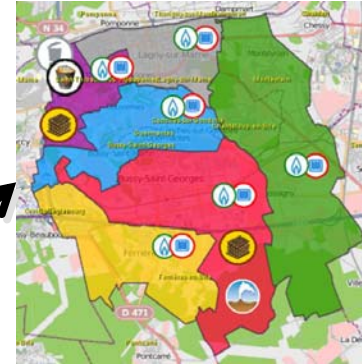
Current situation



Case study in Marne-la-vallée (France)

Outputs:

1. Operational costs, Investments costs
2. Exposition to the energy price
3. CO2 emission reductions



2020

Scenario A

- District heating
- Co-generation
- Biomass boiler
- Import from national grid



Scenario B

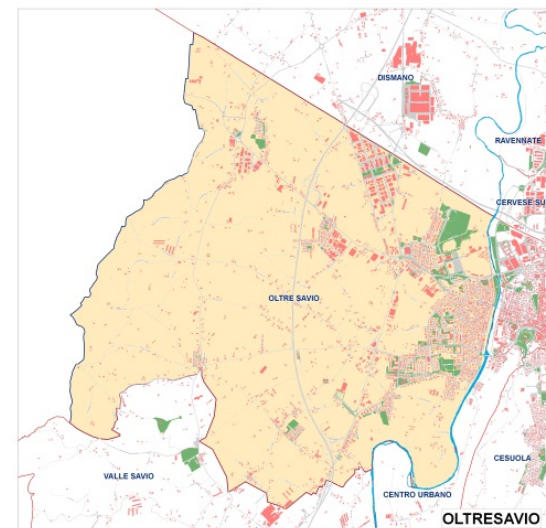
- Decentralised solar units
- Import from national grid

CitInES: application example

Cities of Cesena and Bologna

End-user needs: common issues for Cesena and Bologna

- General:
 - Monitoring and assessment functionalities
 - Data management
 - Calculation of municipal energy balance
 - Impact assessment and confrontation with SEAP objectives
 - Economic risk analysis
 - Communication



CitInES: application example

Cities of Cesena and Bologna

End-user needs: common issues for Cesena and Bologna

- **Energy demand:**
 - Monitoring of progress indicators for demand-side actions
 - Monitoring of aggregated energy consumption
 - Support the definition of complementary actions
- **Energy generation and distributions:**
 - Monitoring of progress indicators for supply-side actions
 - Support the definition of complementary actions
- **Energy impact of transport and urban planning:**
 - Monitoring of specific progress indicators for urban planning
 - Monitoring of aggregated progress indicators for urban planning
 - Monitoring of the progress indicators for the specific measures of transport plans
 - Support the definition of complementary actions

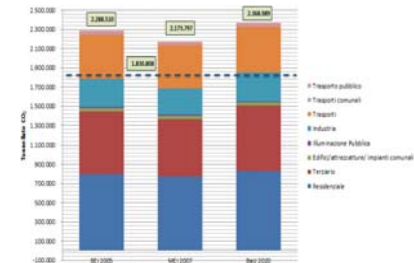
Current project state : Cesena & Bologna use case

Work Package 1 - finished

- Specification of the end-user needs
- Description of the current situation and action plans
- Description of available data

Work Package 2 - under work (until March 2013)

- System modeling (100%)
- Macro-model calibration (10%)

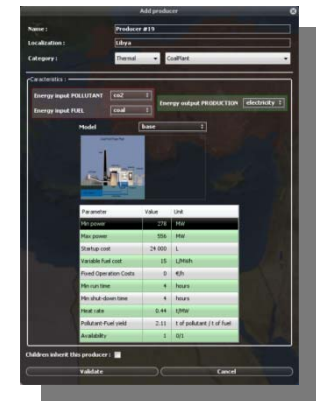


Work Package 3 - under work (until March 2013)

- Description of the long term vision (50%)
- Advanced Sustainable Energy Strategy (10%)

Work Package 5 - to begin in May 2013

- Integration of the tool & experimentation





AIT Austrian Institute of Technology

your ingenious partner

<http://www.citines.com/>

CitInES

City and Industry
Energy Strategy



Daniele Basciotti

daniele.basciotti@ait.ac.at