The goal of Wintegrate yr 3

To submit three requests for building permits for wind turbines in the Brussels Capital Region
Main insights from Wintegrate yr 1 + 2

Brussels has a good number of valid sites
See wind maps and CFD micro-siting

Vibration and acoustics are under control
Through a good mounting setup

Brussels wind shows strong economic impact and valorisation potential

We used CFD to optimise location and height

Turbines on rooftop require careful placement
We formulated practical guidelines for Brussels

Standard rules of thumb too simple
Overly conservative for tall buildings
We measured vibrations on two of our test turbines

Vibration analysis is required for urban application

Our data was applied on building models (by bureau Greisch)

Vibration spectrum is only weakly dependent on wind speed
What about different turbines?

Dominant modes are from the mast, which has roughly standard dimensions and usually similar stiffness (steel) so dominant frequencies vary little over different types of HAWT

So vibrations are quite generic

Structural impact of vibrations can be easily mitigated

Small turbines have no impact when mounted on the supporting structure of the building

Otherwise, local reinforcements may be necessary

Added damping not appropriate

Use counterweights for fixation on roof
Noise from small turbines is dwarfed in background noise

Background noise in BCR: 
\[ L_{den} > 45 \text{ dB}(A) \]

Noise immission from turbine at 60 m is below 40 dB(A)

Rooftops are noisy

The public is sceptic, but also curious

A CEESE (ULB) study of public acceptance points to 
Lack of knowledge
Need for best practices

Local energy production induces awareness 
Use interactive display to engage the public
Wintegrate yr 3 demonstrates the feasibility in Brussels

We consider small turbines for rooftop installation about 5.2 kEUR / kW

Annual production 8000 - 14 000 kWh

Payback time of 7-8 yr for SME

The medium term shows strong economic impact

Stimulate activity over entire value chain
What is the economic impact on the long term?

We estimate that Brussels has potential for roughly 50 sites, 3 turbines per site.
Annual yield of around 1.5 GWh
But rooftop crowding should be managed.

What we are doing in yr 3

is a demonstrator project
Prepare building permits for the installation of rooftop-mounted wind turbines

We draw up a detailed feasibility report, the owner submits the request for a permit

We assist with the development of a legal framework
Our valorisation assets

Our knowledge of the market of small wind turbines
Our expertise with
  feasibility studies
  measurements of wind resource assessment
  CFD and micro-siting
  installing, operating, optimising, maintaining wind turbines
Our network, BruWind

Now is the time to install wind turbines in the BCR

Pilot projects have gained momentum
  Technical and economic feasibility is confirmed
  There is willingness to invest

The technical expertise and valorisation potential in Brussels warrant long-term benefits
Wintegrate
Results and objectives

Tim De Troyer
11 May 2015