


Environmental Sustainability: Interconnected Systems

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Our Commitment

At Microsoft, we are committed to software and technology innovations that help people and organizations around the world improve the environment. Our goal is to reduce the impact of our operations and products, and to be a leader in environmental responsibility.

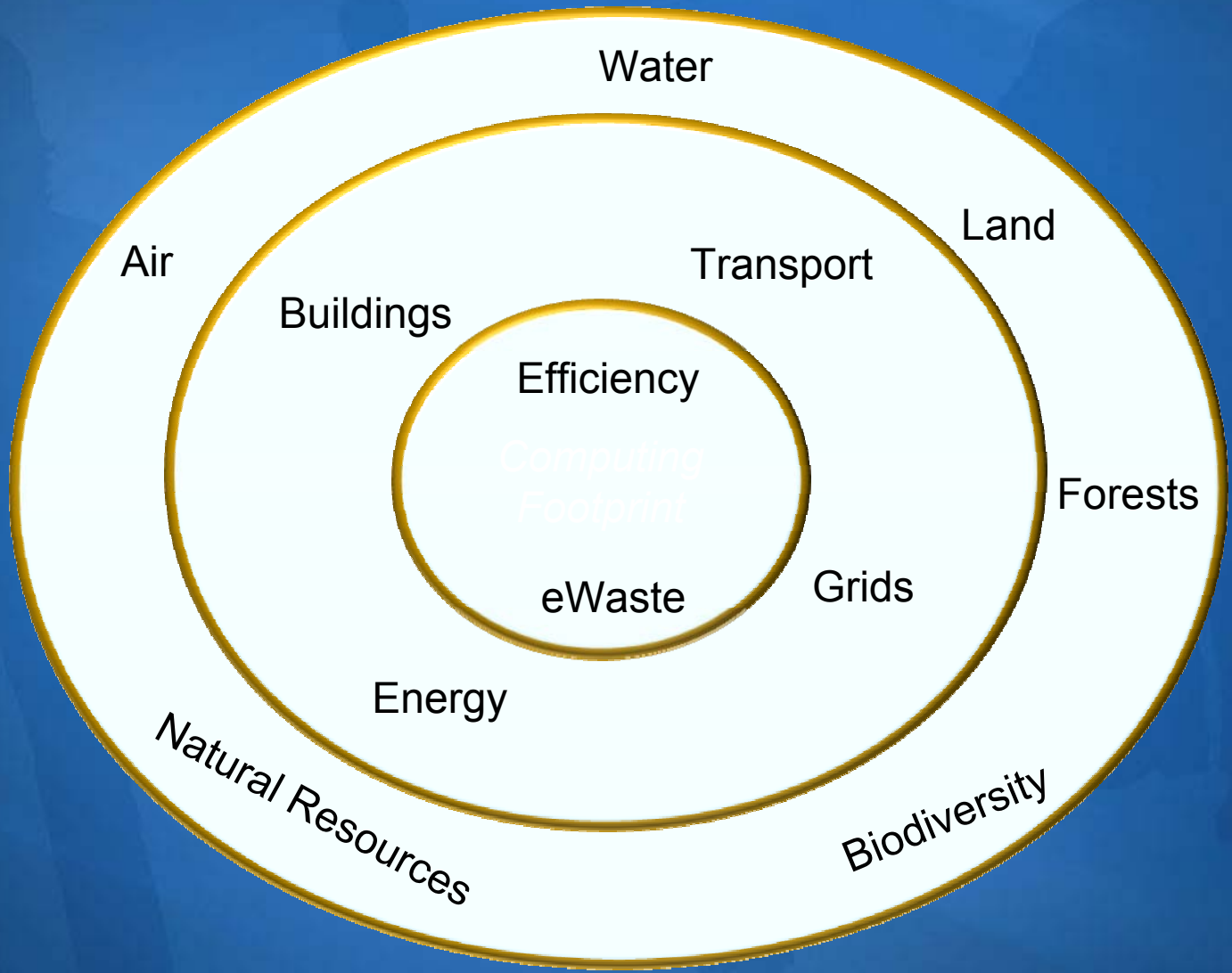
Strategy

Enable Radical Energy Efficiency

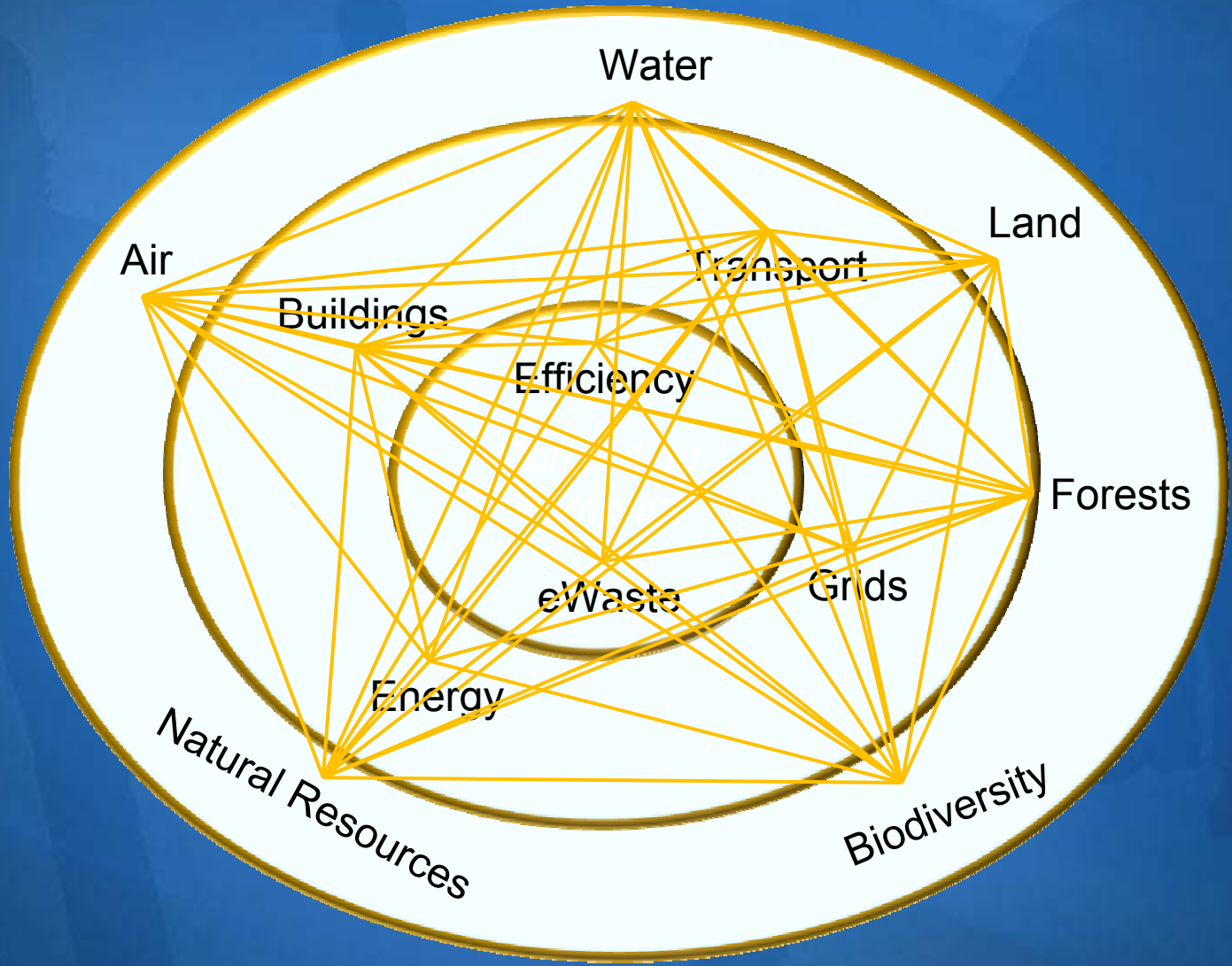
Drive Research Breakthroughs

Responsible Environmental Leadership

Interconnected Systems



Interconnected Systems



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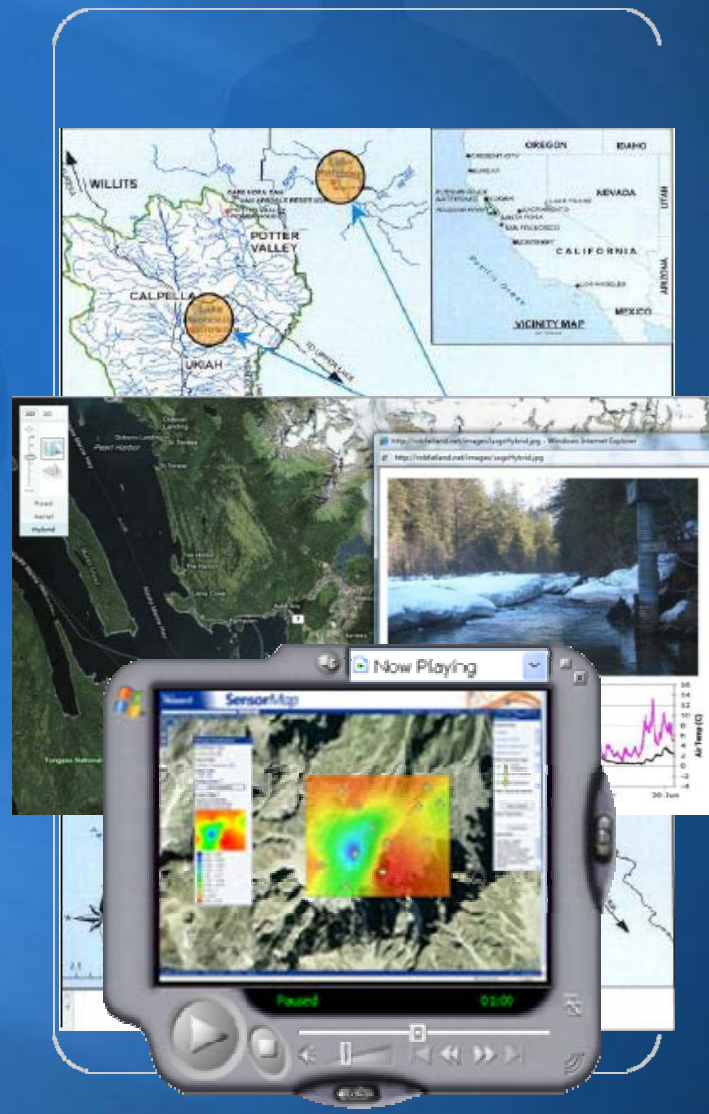
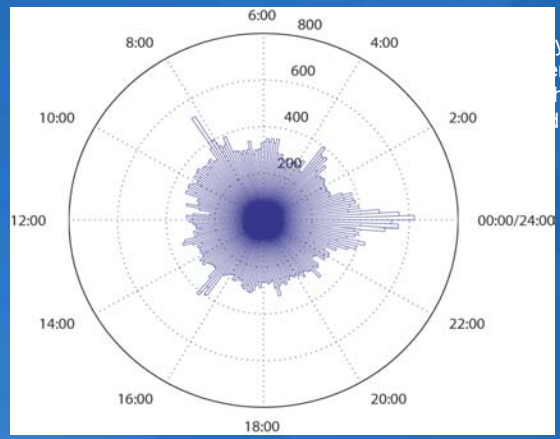
- Understand Physical World in Real-Time
  - **SensorMap**: an open and diverse community of sensor data
  - **ClearFlow**: find routes based on least traffic,
  - **Hydroseek**: Visualizing data in new ways
- We don't really know what lies ahead……
  - Climate Models – implications and impact
  - Species Migrations
  - Fishing stocks
  - Disease paths
- We must aspire to understand, to change, to move forward



Autonomous Monitoring of Vulnerable Habitats

The global climate is changing. Determining how these changes affect the structure and functioning of sensitive ecosystems is essential for their protection.

Here we combine *wireless sensor networks* with *innovative Microsoft software* to automatically monitor sensitive and vulnerable environments. The system has been successfully piloted on Skomer Island, UK to monitor the behaviour and habitat of the Manx Shearwater, an important UK seabird.

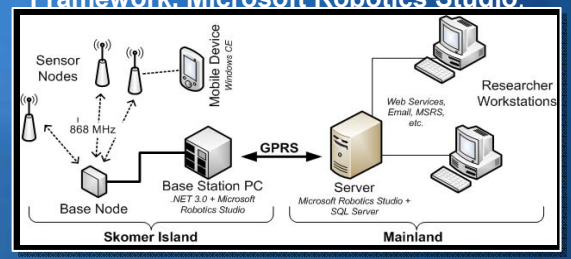


By delivering high-resolution, accurate data over long time periods, the system has already demonstrated its utility and value. It has the potential to underpin advances in understanding a range of ecosystem types.

Providing a system that enables:

1. Real-time remote monitoring and analysis;
2. Intelligent sensing;
3. Remote setup, maintenance and control.

Harnessing a combination of different Microsoft technologies including **.NET Framework, Microsoft Robotics Studio,**



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Biodiversity Science

The Convention on Biological Diversity set as a goal for its 188 signatory nations the reduction in the rate of biodiversity loss by the year 2010. This project brings together a consortium of leading organizations in the biodiversity policy and science communities.

- In this project Microsoft partners with the *United Nations Environment Programme* UNEP-WCMC and leading institutions worldwide.

- Understanding the geographic distribution of species and how species distributions will change in response to various drivers of environmental change is one of the fundamental problems of biodiversity science: Evaluating and applying emerging ecological niche modelling techniques to study the changing distribution of Mexican cloud forests.

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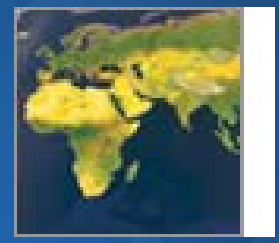
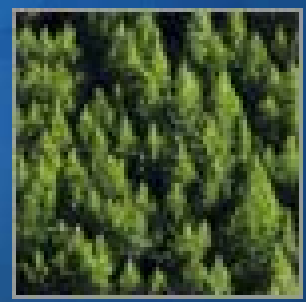
Simulation of Plant Growth and CO2 in the ecosystem



Plant communities may act to amplify or dampen changes in the Earth's climate system caused by anthropogenic CO2 pollution. We are modeling how much CO2 is extracted from the atmosphere and where this carbon is allocated, accelerating & leveraging research in plant growth, biodiversity and ecosystem functioning.



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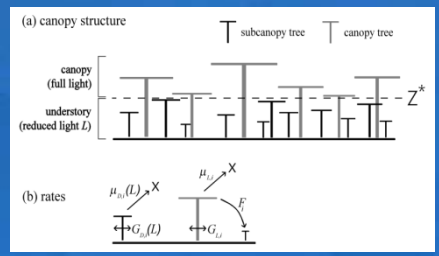
Accelerating Understanding Climate Change

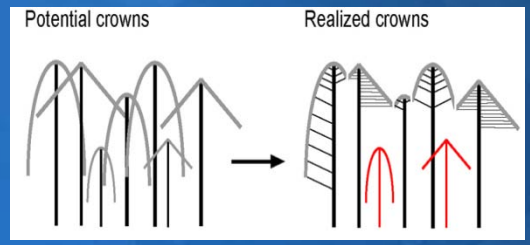
Predictive modelling of Global Forest Dynamics

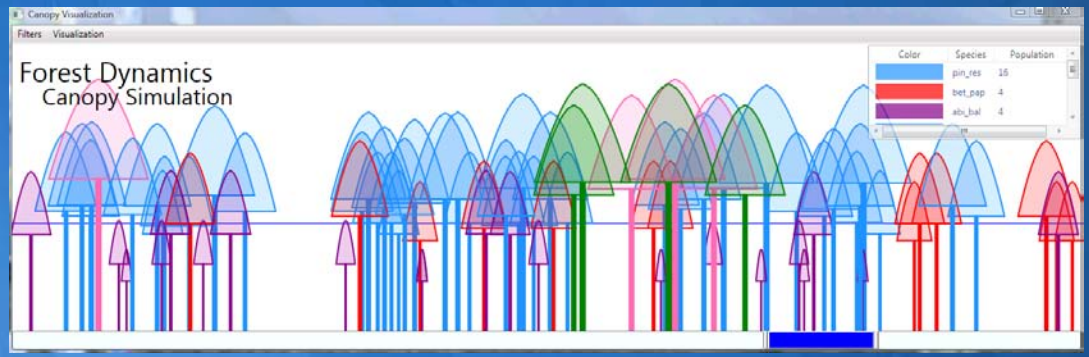
Plant communities are vital to Earth System regulation, but their role and sensitivity to changes is currently barely understood. Scaling from physiology to ecosystems is currently skipped over in Earth System Models, ignores non-linearities in whole plants, interactions between plants within species, or interactions between species, how whole plants respond (growth, mortality) to resources and competition, and dynamics of forest community. *This is the single most important outstanding issue in earth system modelling*

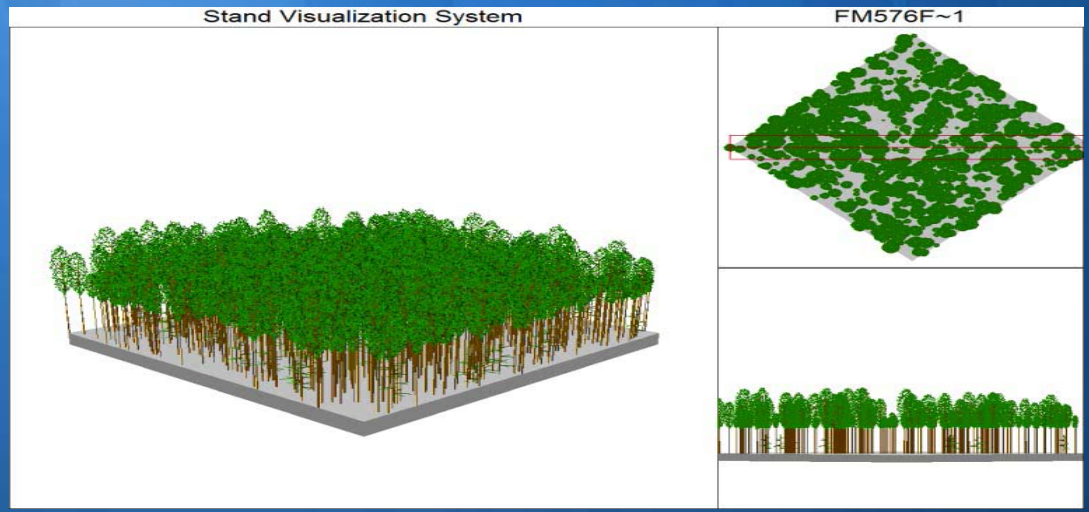
Drew Purves, a scientist in the Computational Ecology Group at MSRC has, together with collaborators Stephen Pacala (Princeton) have developed a predictive model of global forest dynamics and their role in climate regulation and climate change.

This work has recently been published in Science, and – importantly – the model itself will be incorporated into the IPCC climate prediction models









Searching environmental scenarios

The projects “Environmental Scenario Search Engine” and “ClimatePrediction.Net”:

The increasing data volumes from today’s science and the need for an inclusive view on the natural environment requires a new approach to data mining, management and access; the ESSE project includes data from space, terrestrial weather, oceans and terrain, to better understand and thus address “climate change”.

Complex climate models are run on computers of volunteers, so the ClimatePrediction.Net project with the University of Oxford is the largest experiment to try and produce a forecast of the climate in the 21st century with the University of Oxford.

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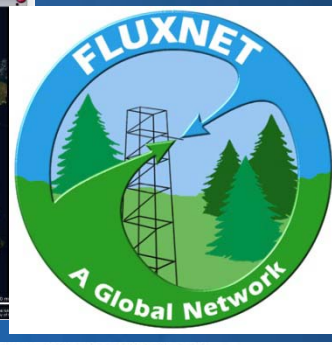
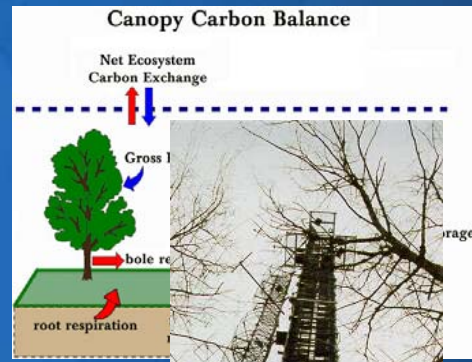
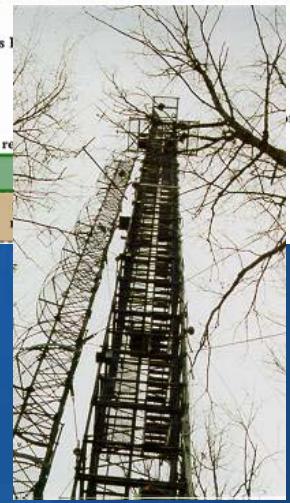
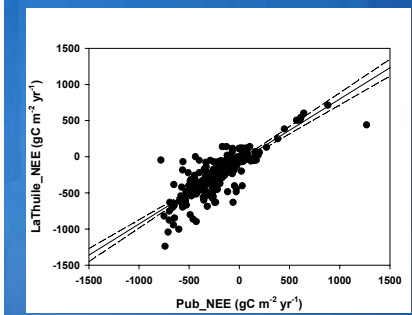
Carbon-Climate Data

- What is the role of photosynthesis in global warming?
  - Measurements of CO2 in the atmosphere show 16-20% less than emissions estimates predict
  - The difference is either due to plants or ocean absorption.
- Communal field science – each investigator acts independently.
- Cross site studies and integration with modeling increasingly important









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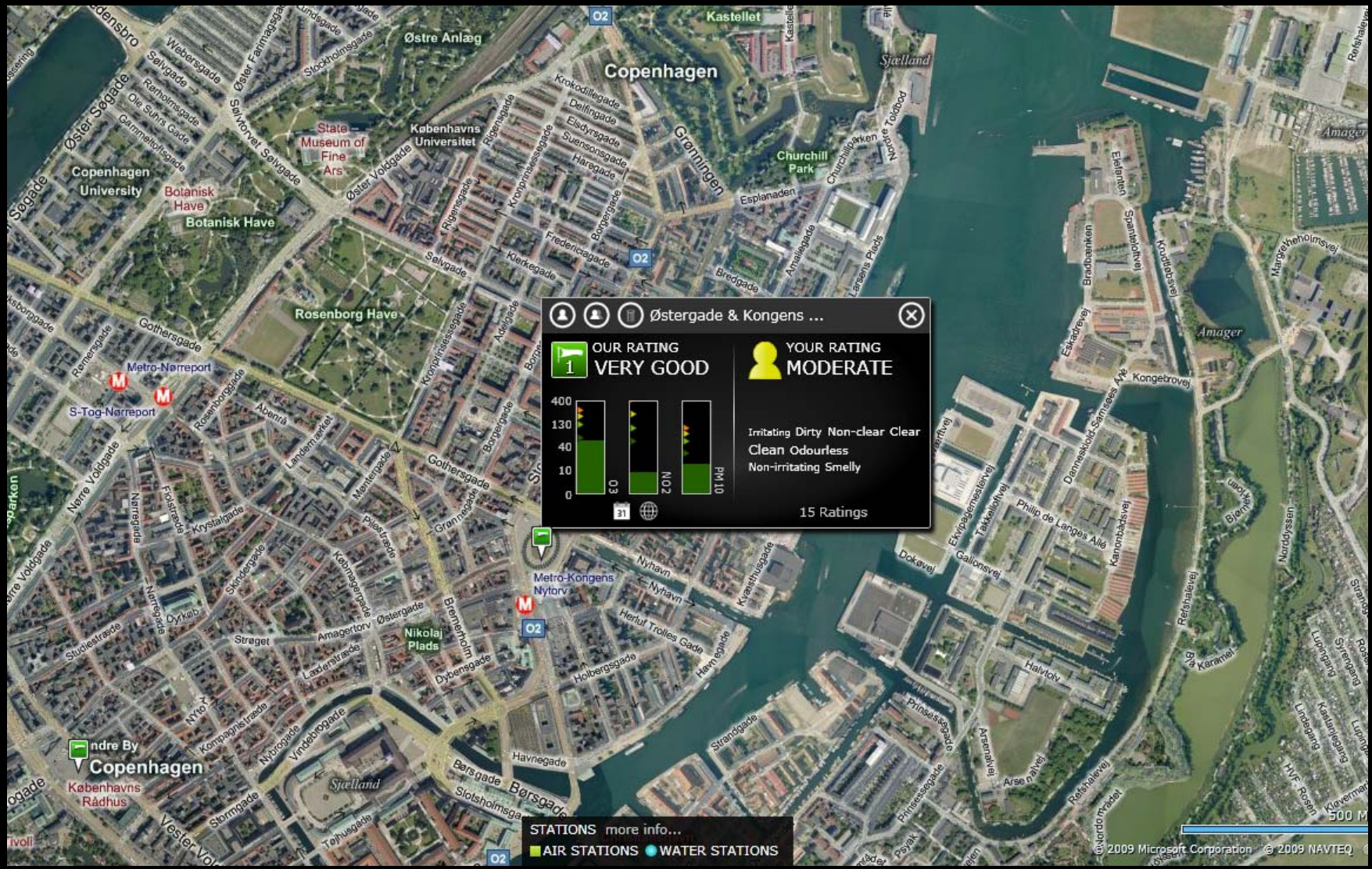

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