Middle East Geospatial Forum
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Sustainable Development for Smart Cities: A Geospatial Approach

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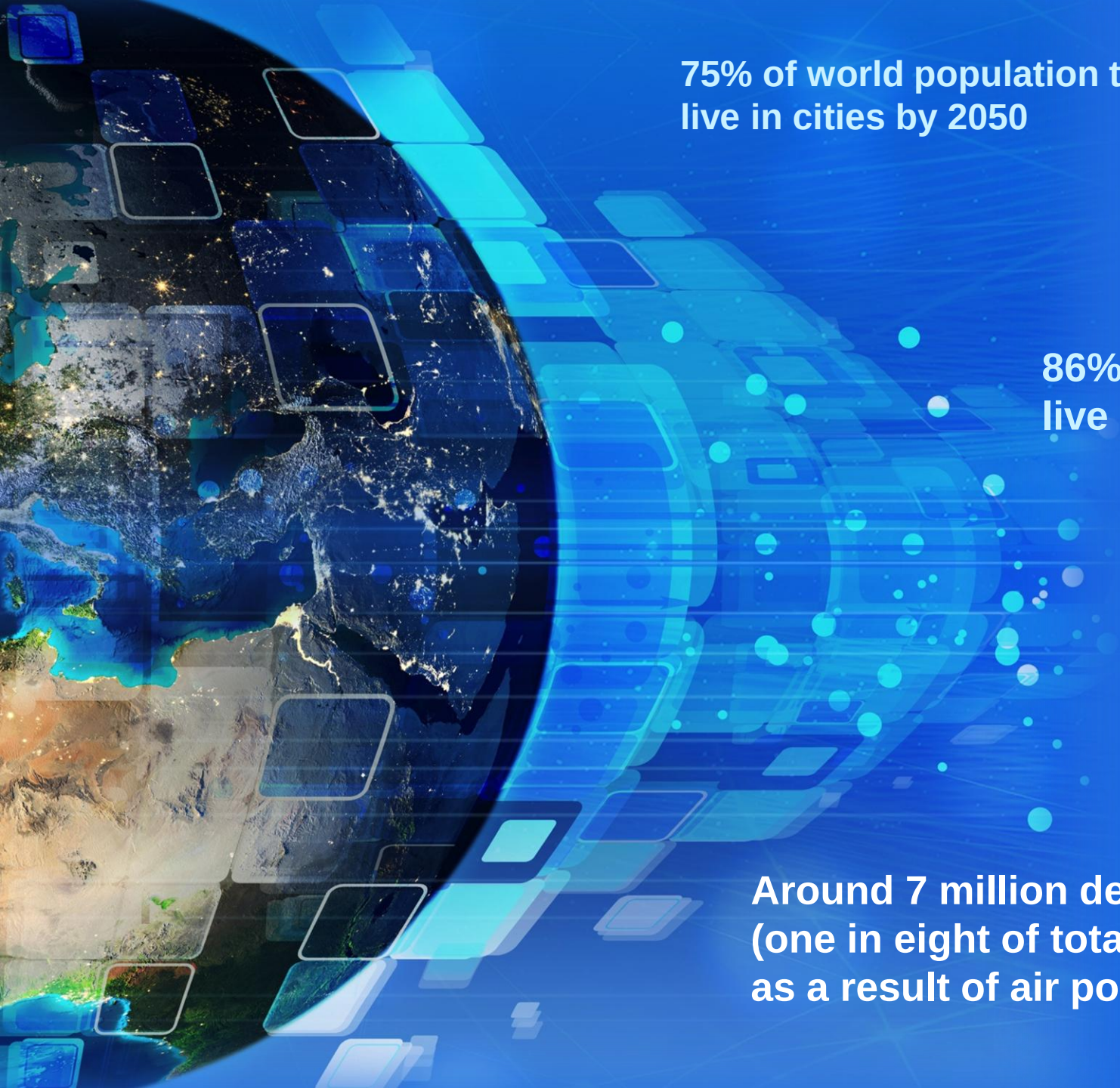
Our World Is Facing Serious Challenges



75% of world population to live in cities by 2050

Global population of 9 – 10 billion people by 2050

86% of GCC population will live in cities by 2020

15+cm rise in sea level in 20th century

56% increase in global energy consumption by 2040

Around 7 million deaths in 2012 (one in eight of total global deaths) as a result of air pollution exposure

2.5 billion vehicles by 2050

Sources: UN, WHO, US EIA, US EPA, International Transport Forum

Tackling the issues: vision and leadership

“Significant innovation in the production, delivery and consumption of water and energy is vital to our collective future.

Responsible conservation and management, and a culture of sustainability, are important goals for developed and developing nations alike.”

“Ensure sustainable development while preserving the environment, and achieve balance between economic and social development.

Focus on improving the quality of air, preserving water resources, increasing the contribution of clean energy and implementing green growth plans.”

“Preserve and enrich Abu Dhabi's physical and cultural identity.

Creating an always improving quality of life for residents on four equal pillars of sustainability: environmental, economic, social, and cultural.”

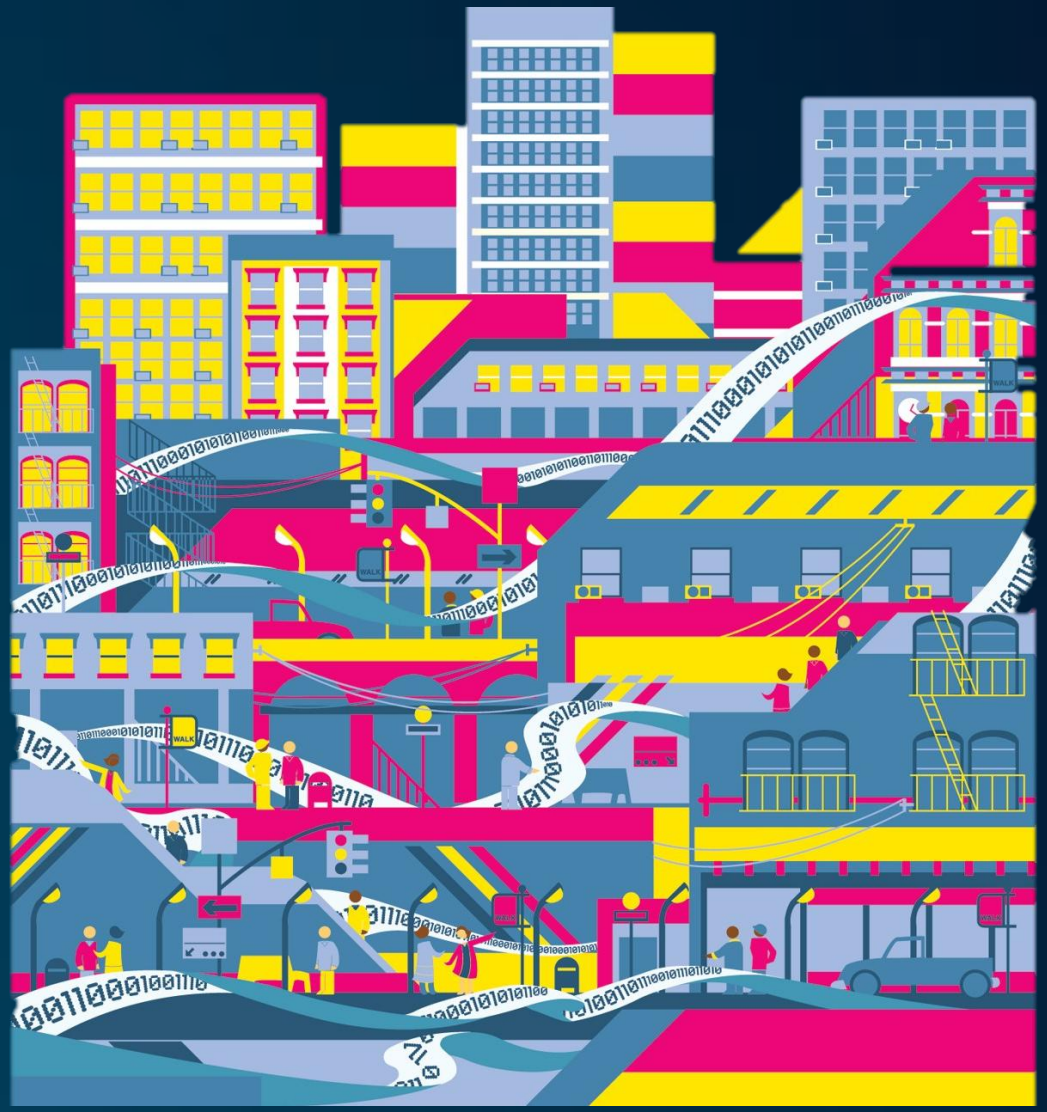
Smart Sustainable Cities

“A smart sustainable city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social and environmental aspects”.

UN International Telecommunication Union

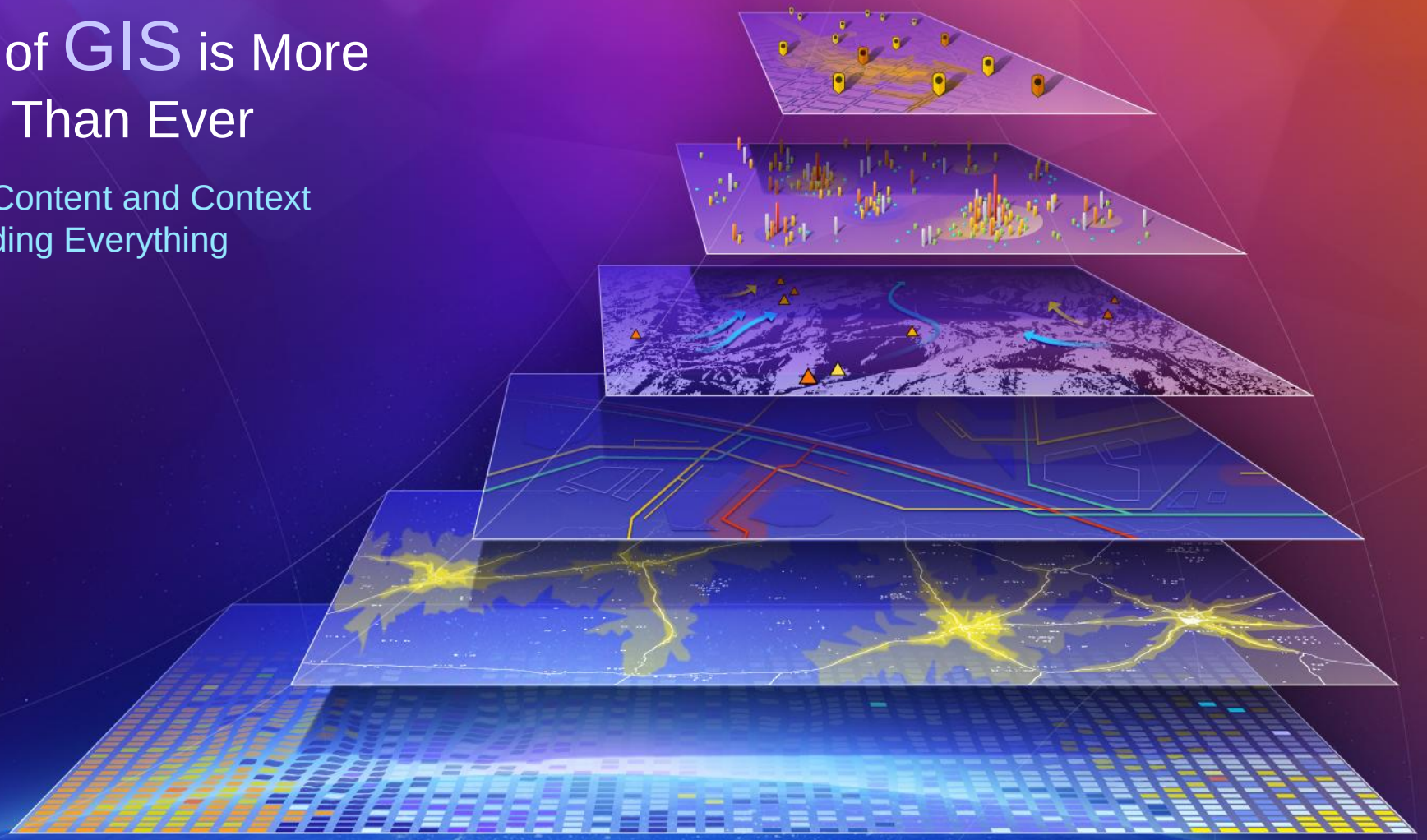
Smart Sustainable Cities

- GIS plays an important role in enabling smart cities, as every resource in a city has location.
- The role of GIS will continue to grow as more spatial data is collected from mobile devices and the increasing use of sensors.
- Smart cities will increasingly use 3D visualisation and analysis in planning their growth.

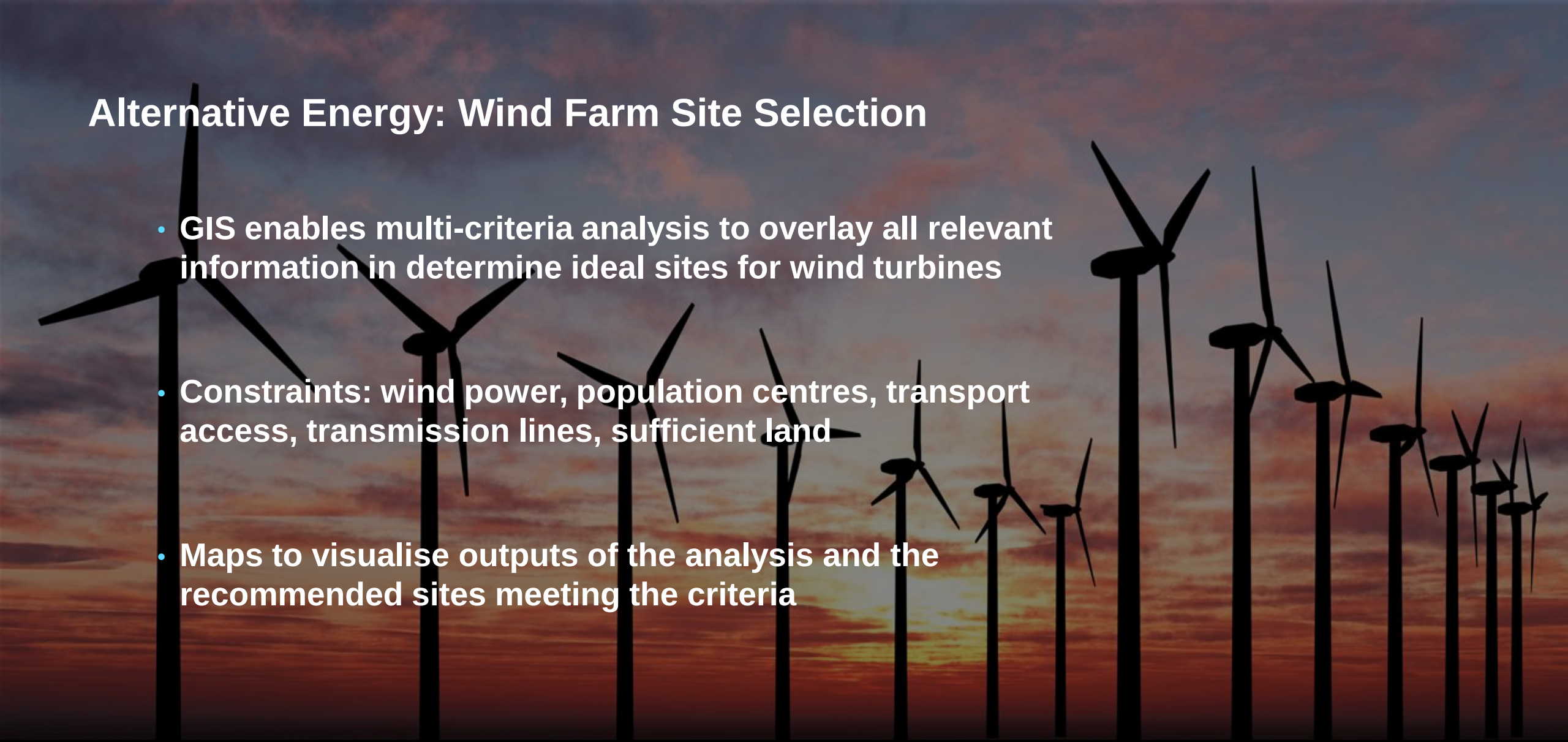


The Role of GIS is More Important Than Ever

Providing the Content and Context
for Understanding Everything



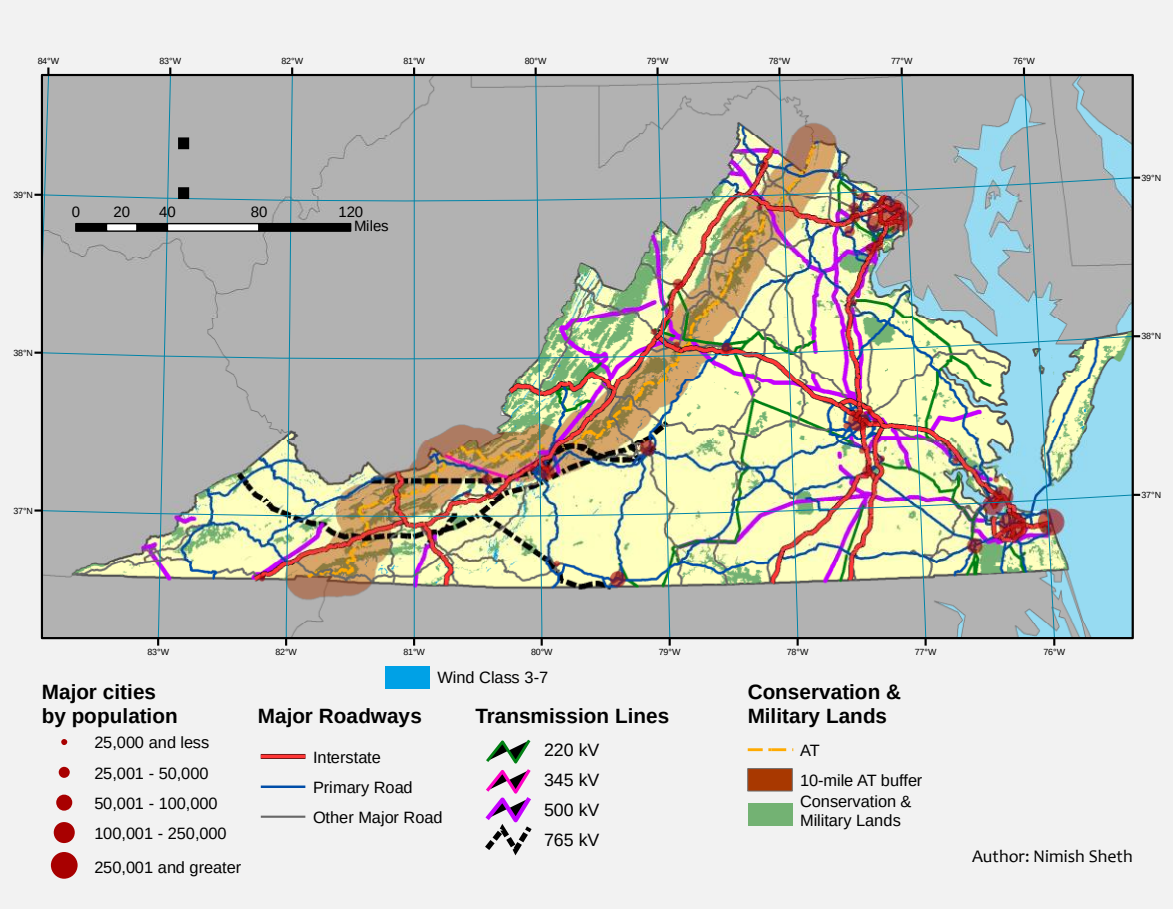
Alternative Energy: Wind Farm Site Selection



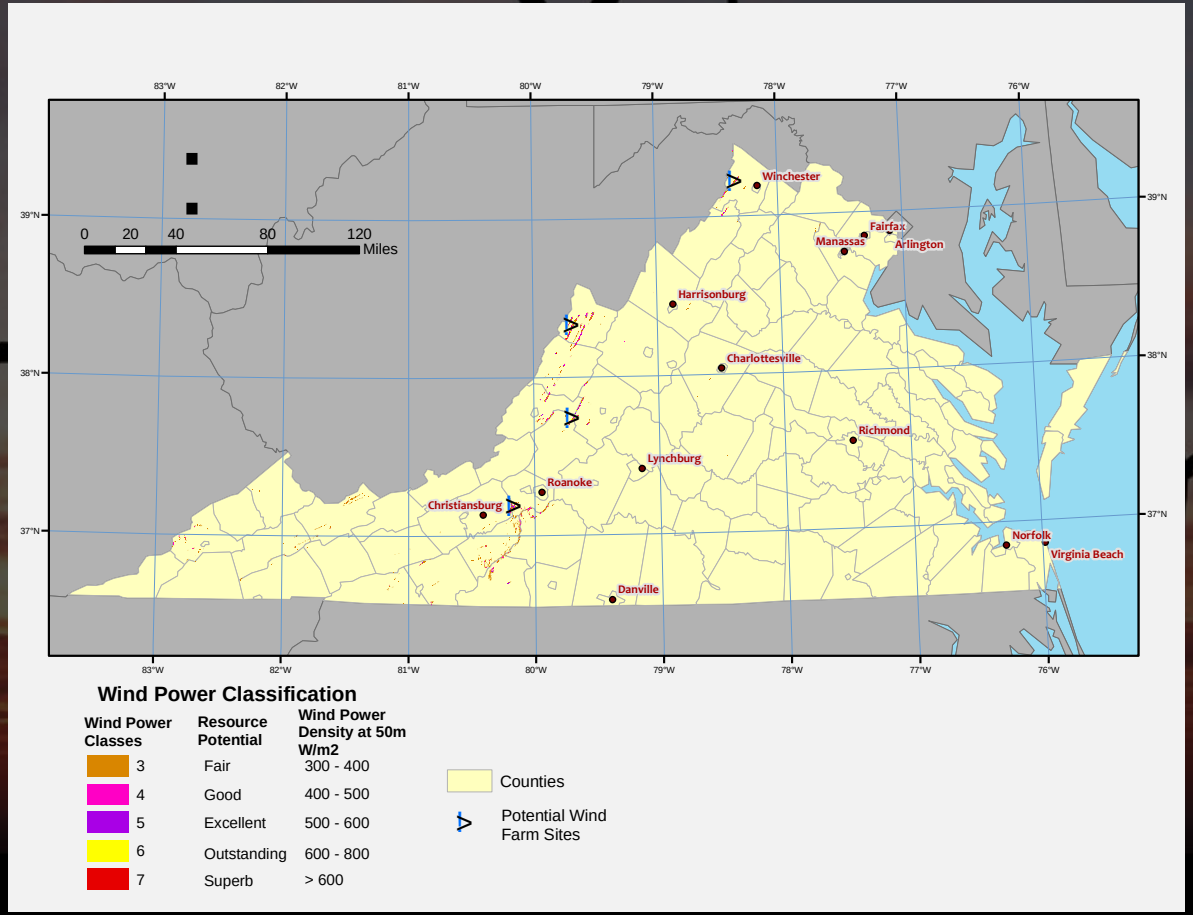
- GIS enables multi-criteria analysis to overlay all relevant information in determine ideal sites for wind turbines
- Constraints: wind power, population centres, transport access, transmission lines, sufficient land
- Maps to visualise outputs of the analysis and the recommended sites meeting the criteria

Alternative Energy: Wind Farm Site Selection

Constraints



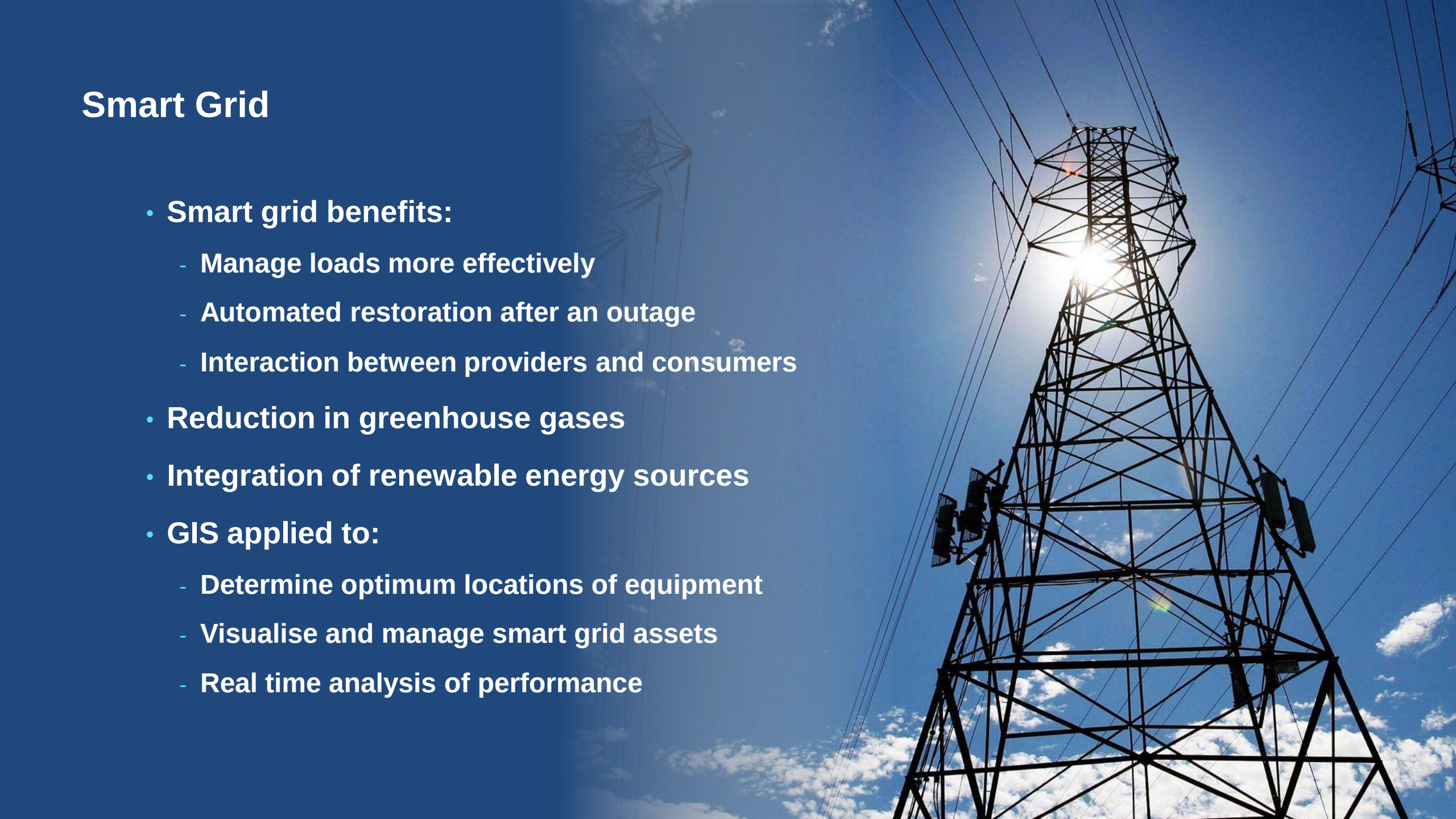
Proposed sites



Virginia, USA

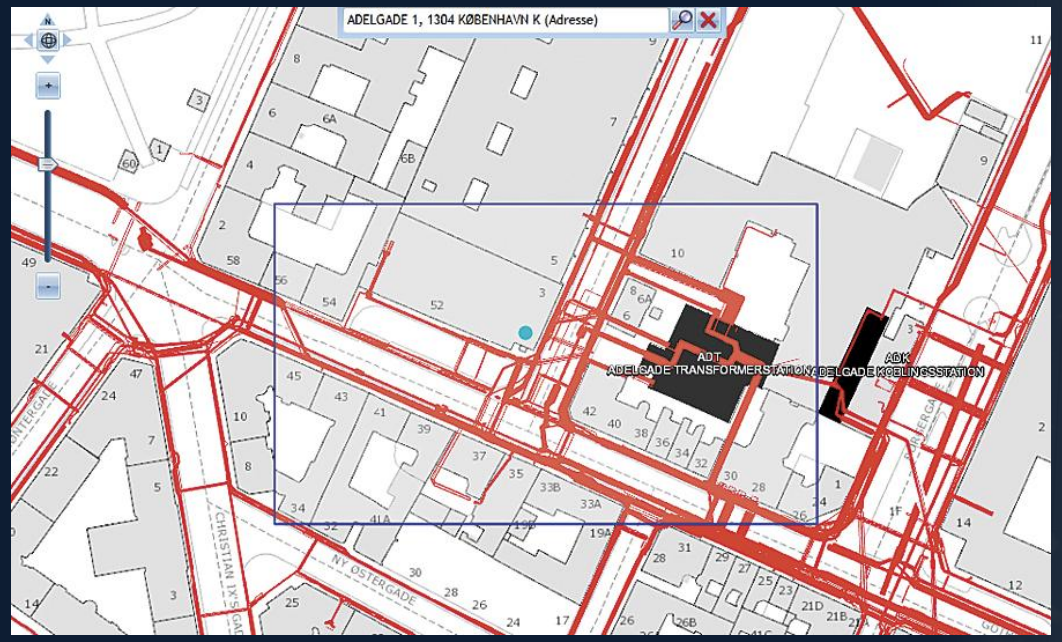
Smart Grid

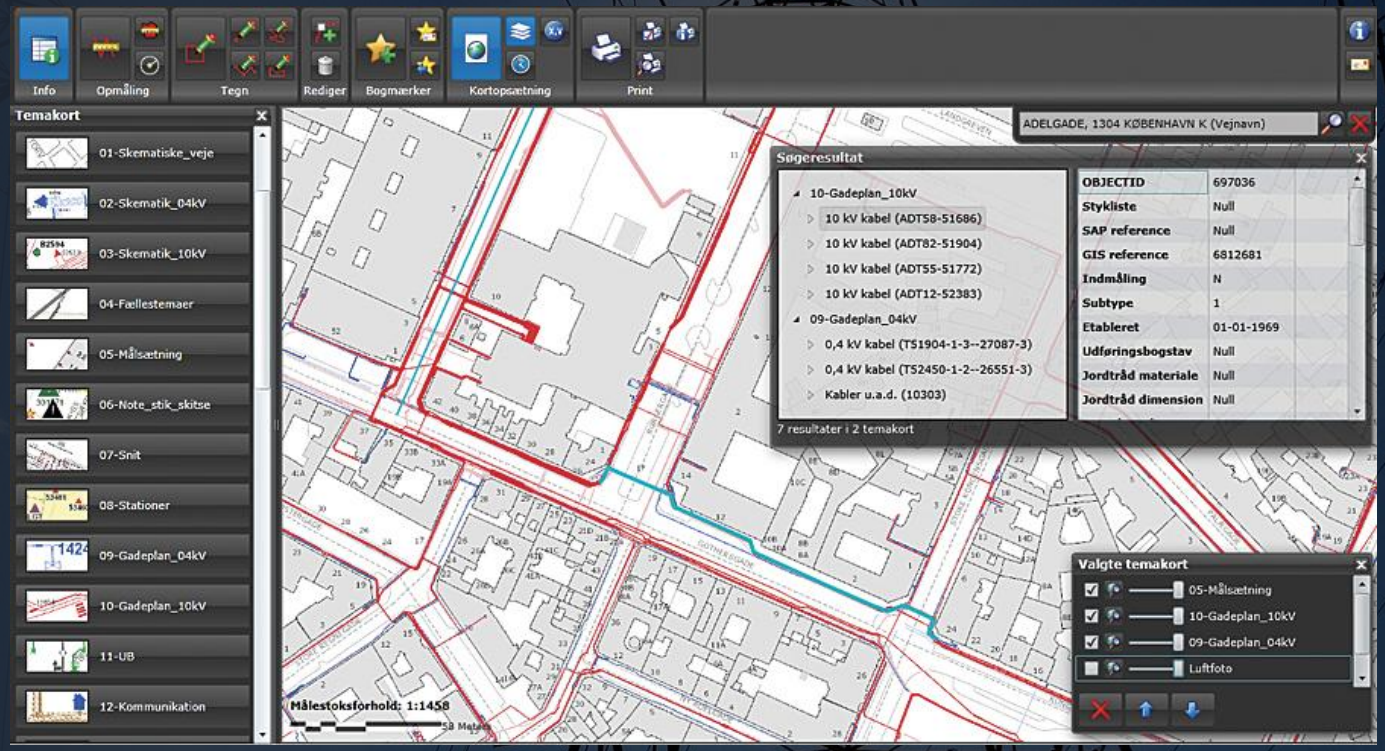
- Smart grid benefits:
  - Manage loads more effectively
  - Automated restoration after an outage
  - Interaction between providers and consumers
- Reduction in greenhouse gases
- Integration of renewable energy sources
- GIS applied to:
  - Determine optimum locations of equipment
  - Visualise and manage smart grid assets
  - Real time analysis of performance



Smart Grid

DONG Energy, Denmark

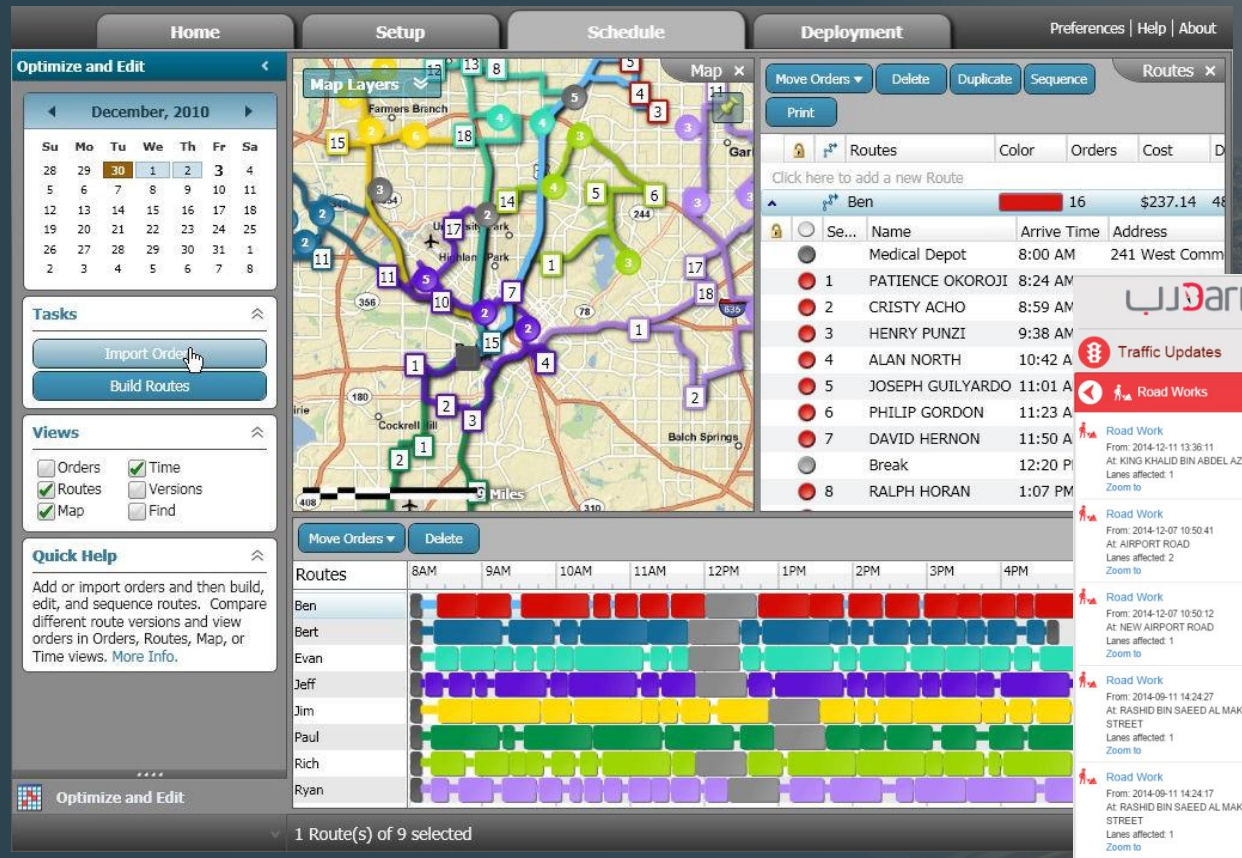




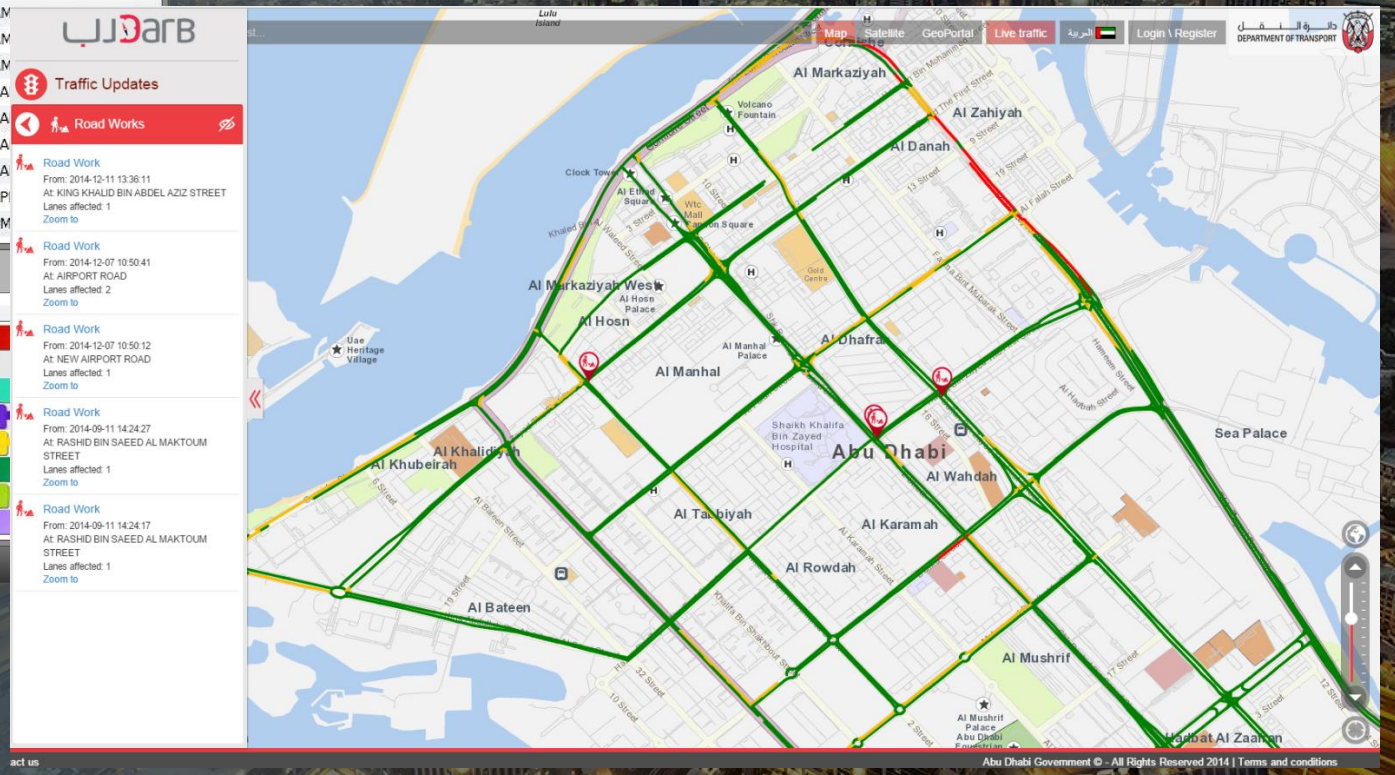
Routing and Logistics

- Optimisation of fleet routing using GIS
- Reduction in fuel usage and carbon emissions
- More efficient use of existing assets through better planning and precise routing

Routing and Logistics



Esri Route Planner

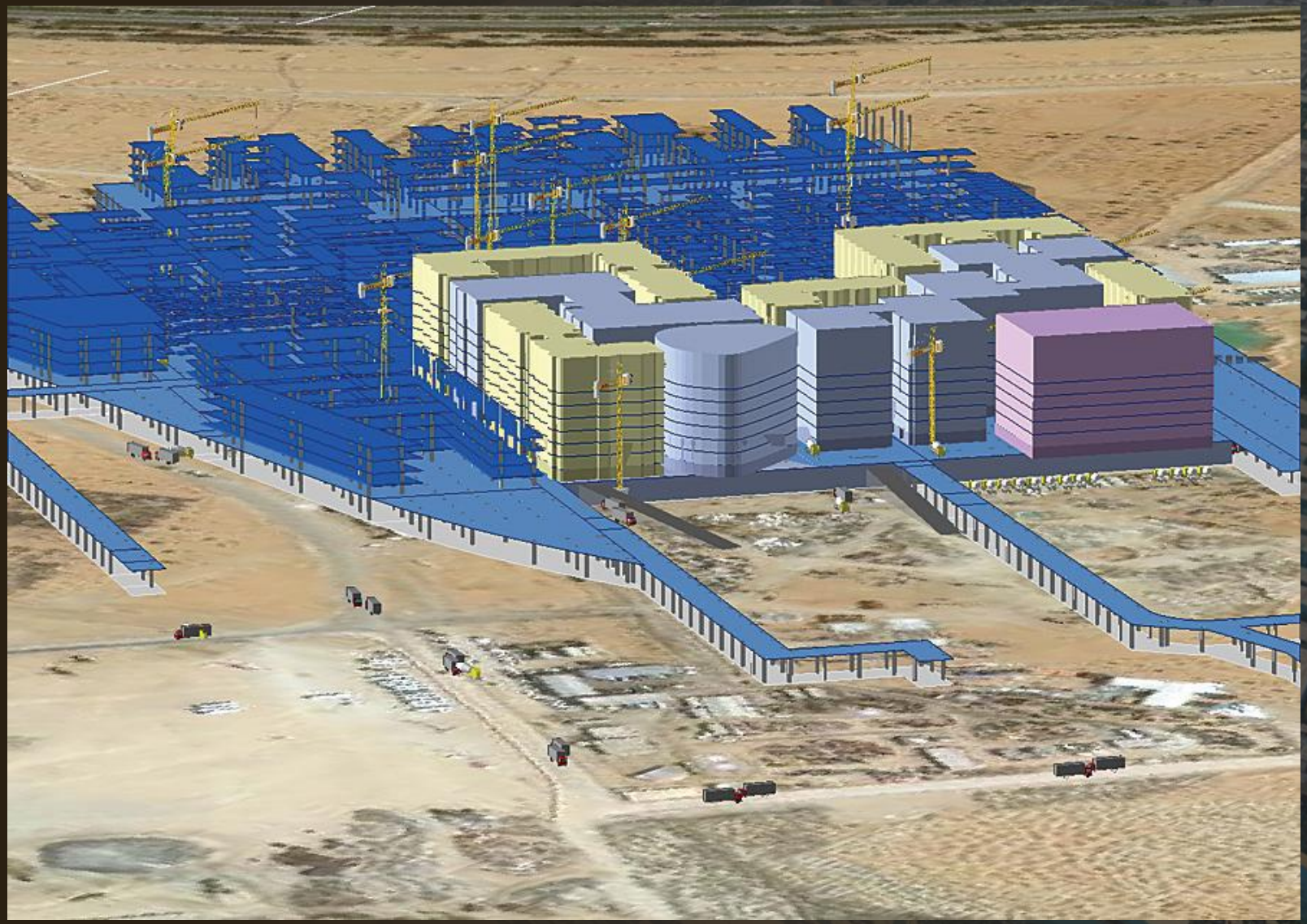


Traveller information systems

Smart City Planning: Masdar City, Abu Dhabi, UAE

- Carbon neutral, zero waste city
- ArcGIS used for spatial planning, modelling, programme management, tracking of costs and schedules
- GIS supported site selection, evaluation of alternatives and visualisation of construction sequences
- Asset management and modelling of resource usage

Smart City Planning: Masdar City, Abu Dhabi, UAE



GIS Is Evolving

Your GIS Is Becoming
Part of an Interconnected Platform

Web

Open

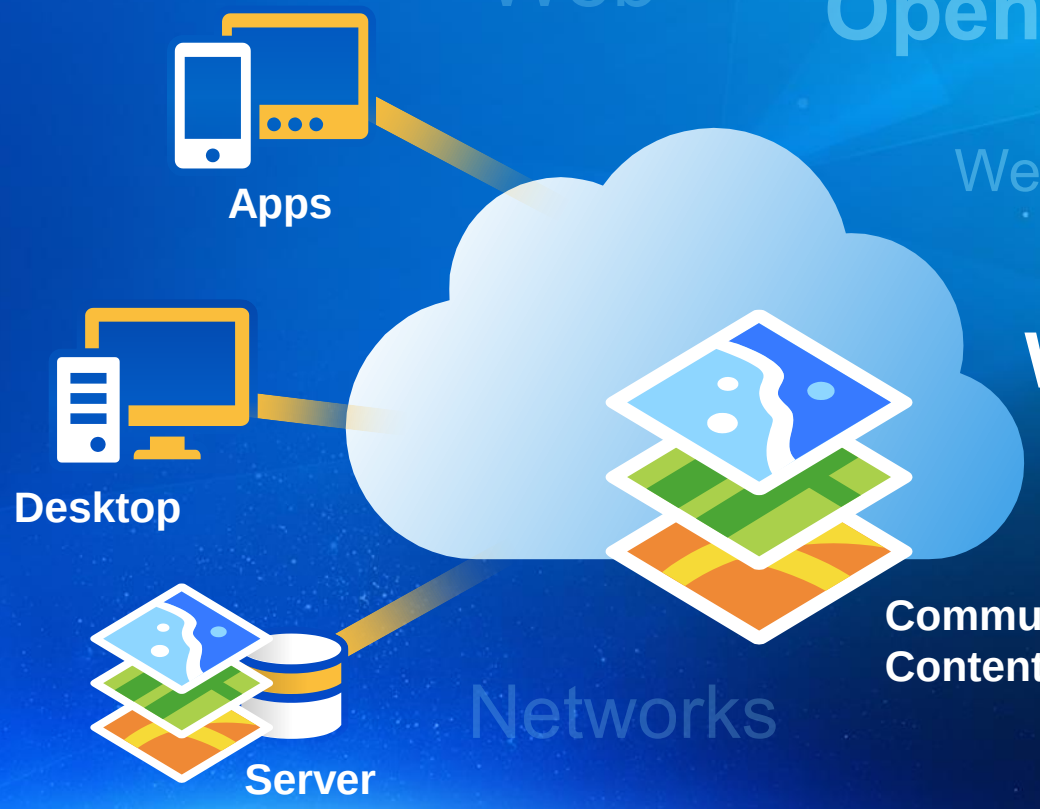
Web Services

Faster Computing

Devices

Networks

Cloud

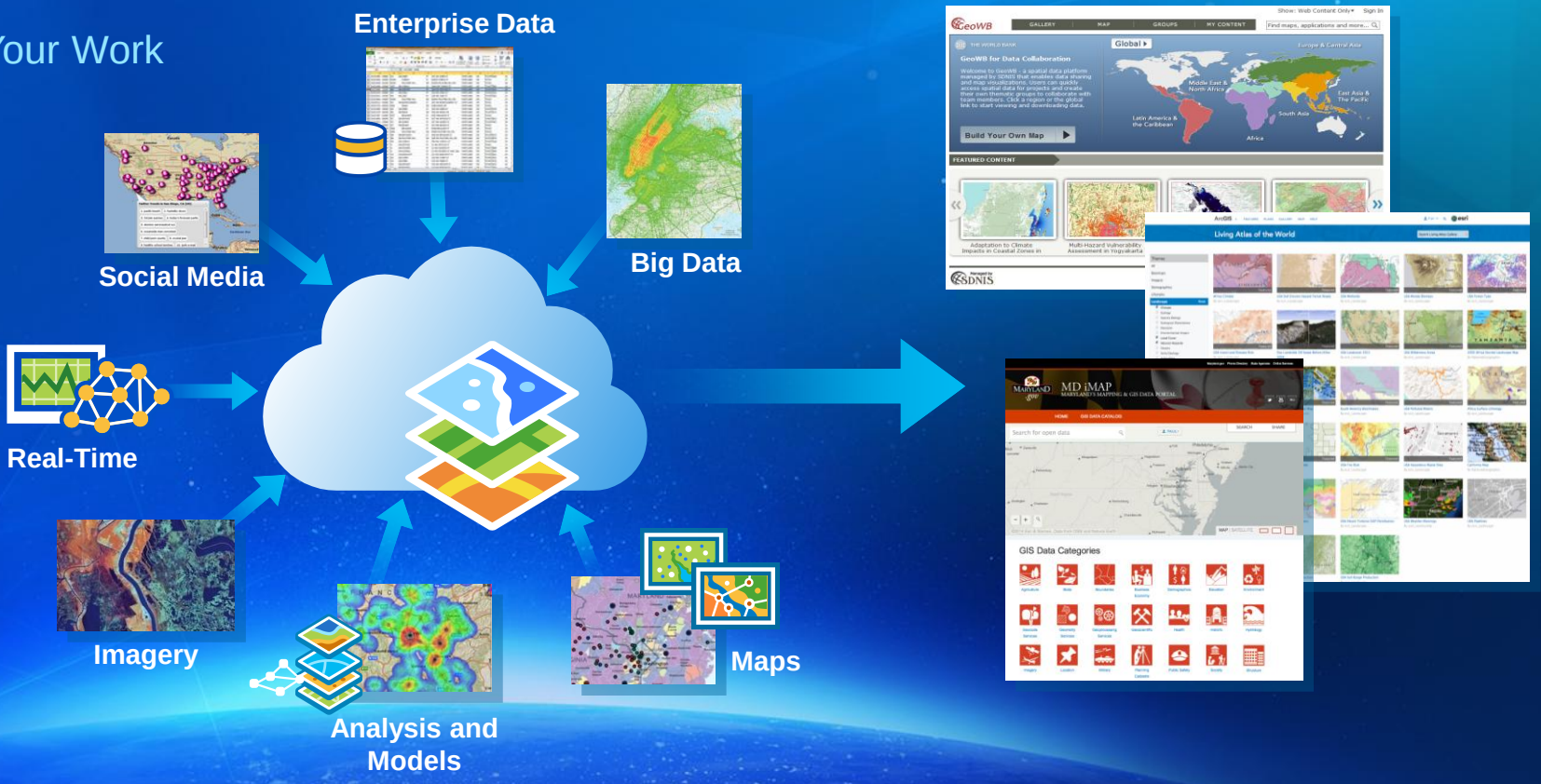


Web GIS

Bringing Together Data, Technology, and People . . .
. . . Creating a Framework for Solving Complex Problems

Web GIS Integrates All Types of Information

Organizing and Sharing Your Work



Both Internally and on the Open Web

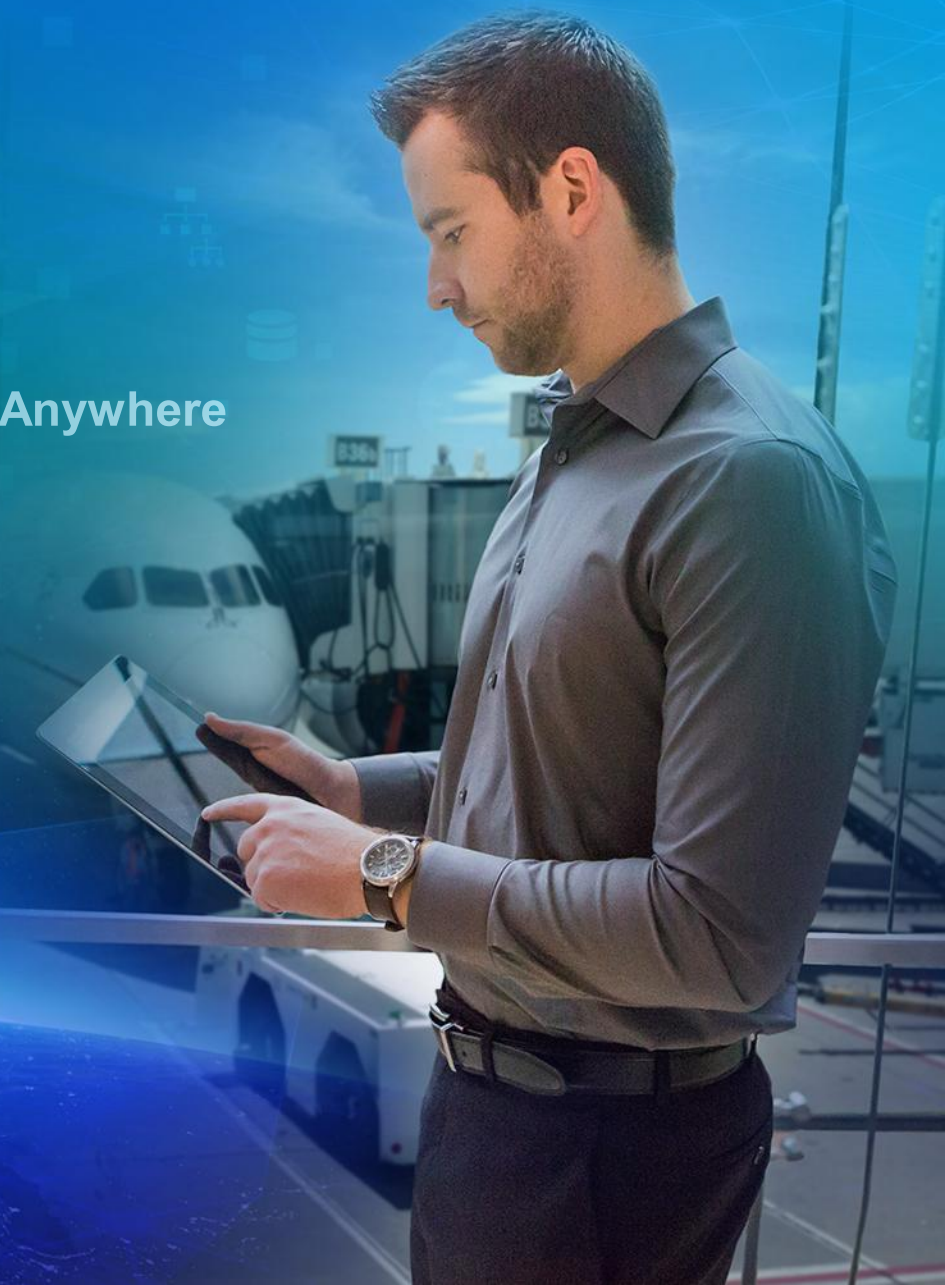
The App Revolution

Is Making Web GIS Available Everywhere

Anytime

Anywhere

Any Device

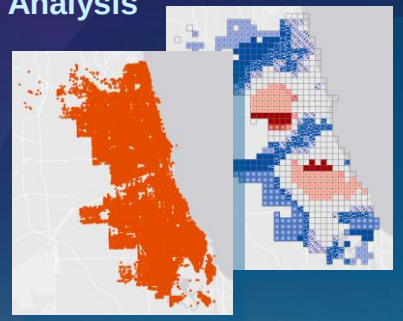


Spatial Analysis

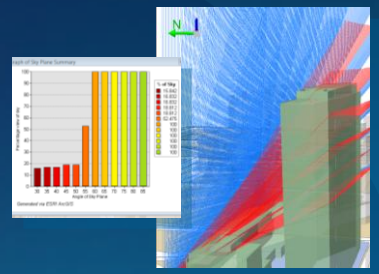
Supporting Demands for
Better Understanding

Desktop

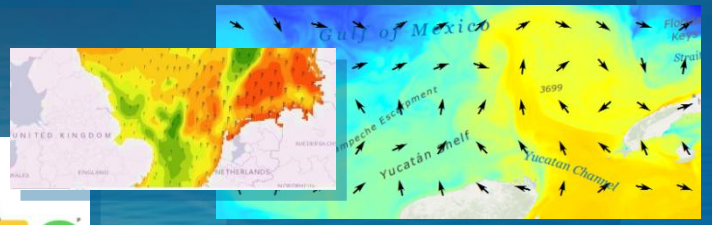
Space-Time
Pattern Analysis



3D Analysis

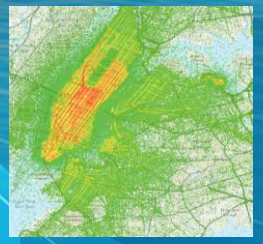


Flow Visualization



Improved Modeling

Multidimensional Data

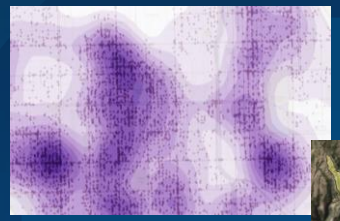


Big Data

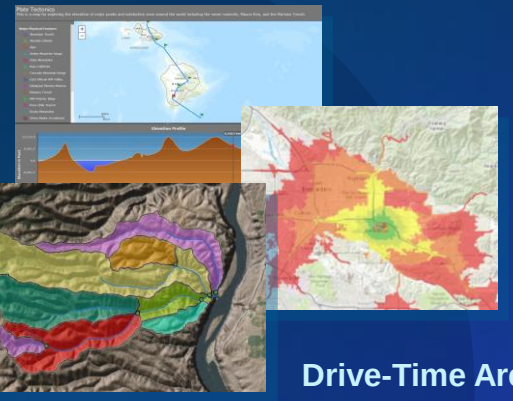
Infographics

Online

Interpolation



Terrain

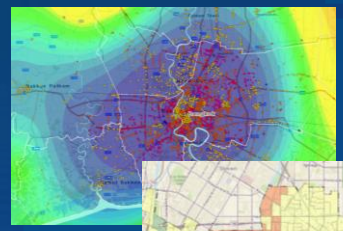


Density

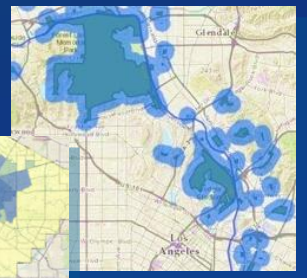
Route Optimization

Drive-Time Areas

Buffer

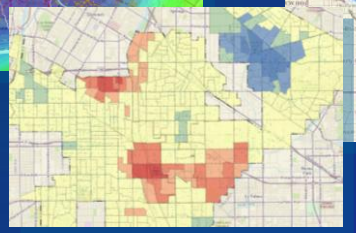


Find Nearest



Aggregation

Overlay



GeoEnrichment

Hot Spots

Advancing the Science of Geography

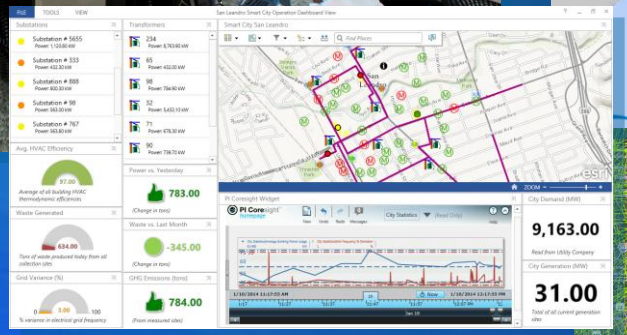
Real-Time

Supporting Geographic Monitoring and Alerting

- Many Sensors
- Spatial Analysis
- Stream Service
- Big Data
- OSIsoft Integration

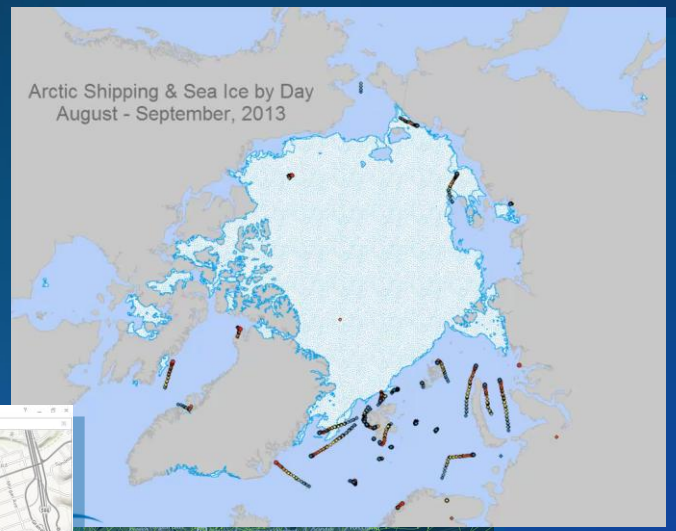
GeoEvent Extension

PG&E



OSIsoft Dashboard

Arctic Shipping and Sea Ice



Exact Earth

Big Data

GIS Supports Sustainable Development for Smart Cities

Leading to GeoSmart Governance

Thank you

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Understanding our world.