

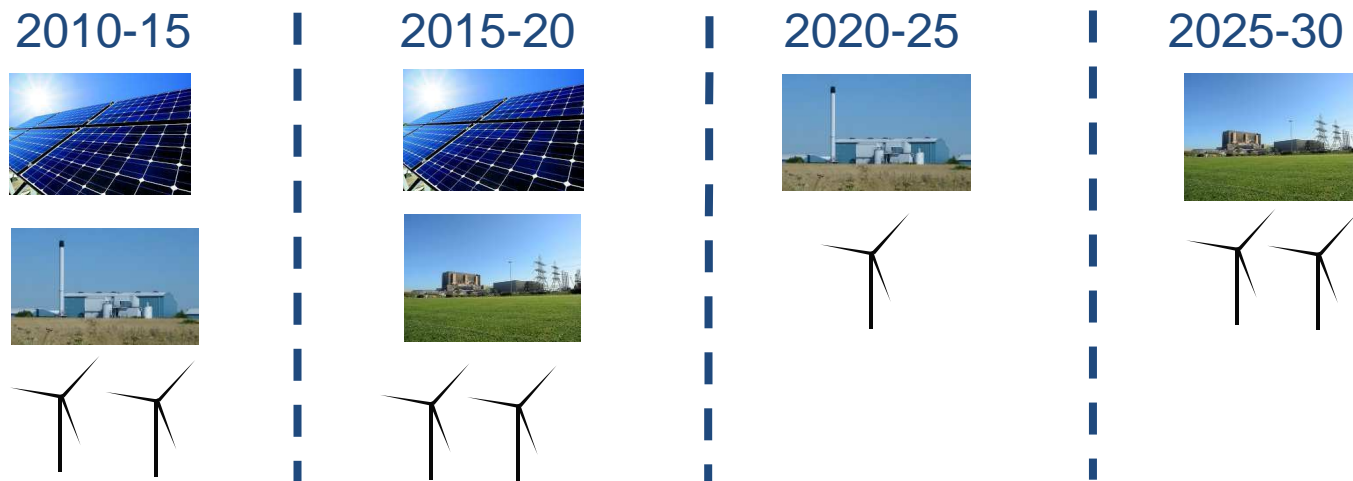
Spatial optimization of energy infrastructure considering ecosystem services

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ADVENT PhD Researcher



Energy Models

- Tell us how much energy is required



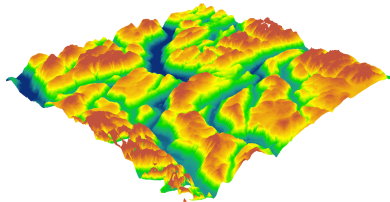
- BUT not where that energy might be located

How do we locate new energy infrastructure?

Resource availability



Physical constraints



Existing transmission

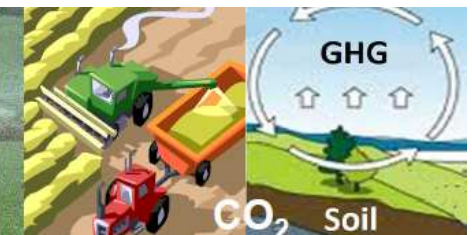
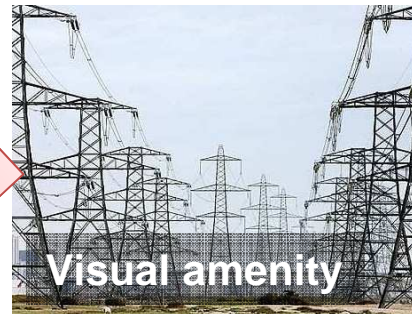


MINIMISE cost

What about ecosystem services?

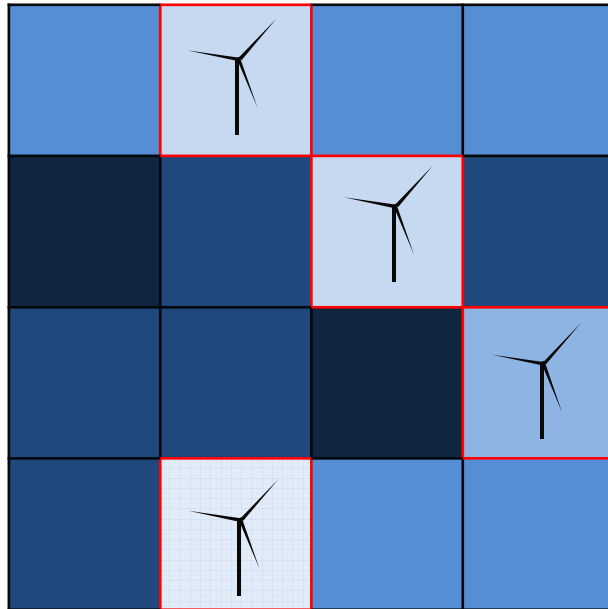


MINIMISE cost



How can we solve spatial energy problems?

1. Locating a single energy technology



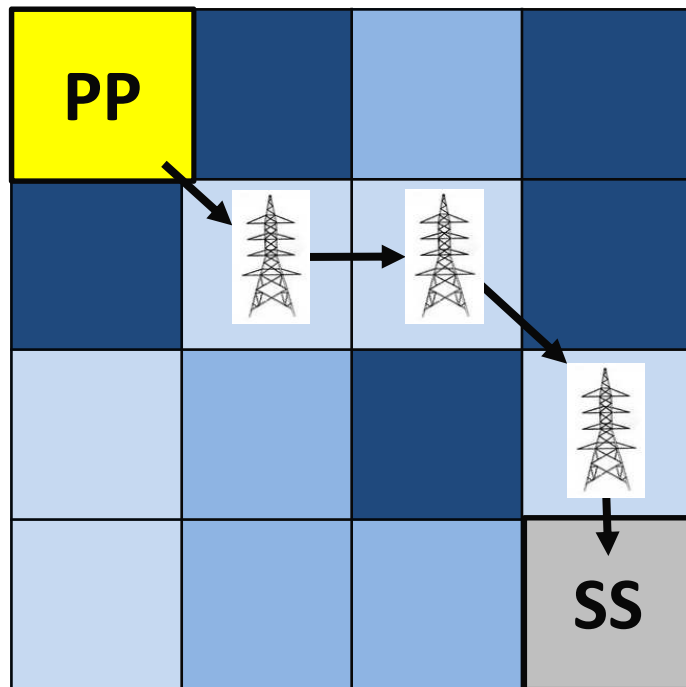
Greedy algorithm

Choose the least cost location
THEN

Choose 2nd least cost location
THEN

Choose 3rd least cost location
AND SO ON...

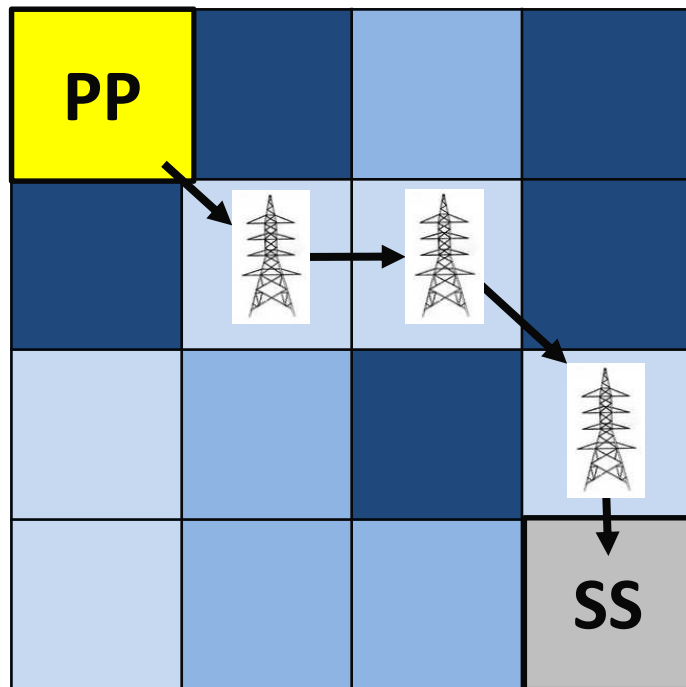
2. Routing transmission infrastructure



Dijkstra's algorithm

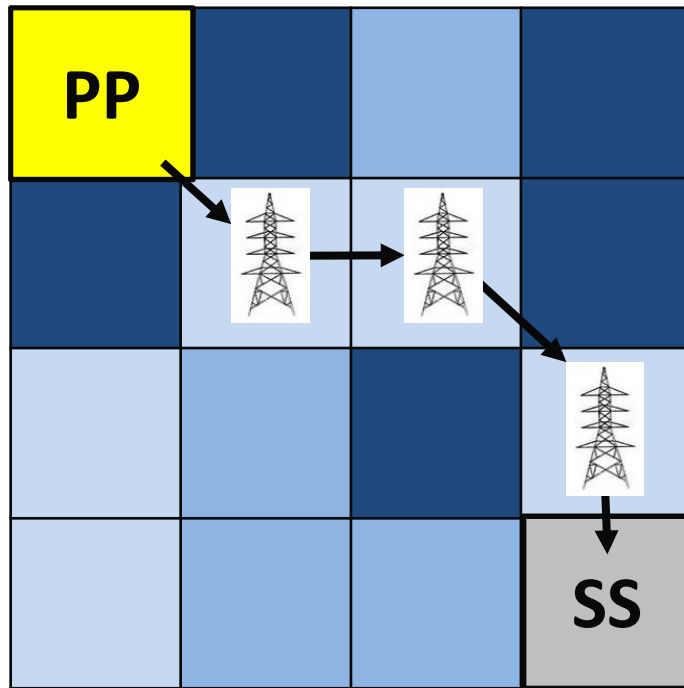
Shortest path problem

2. Routing transmission infrastructure

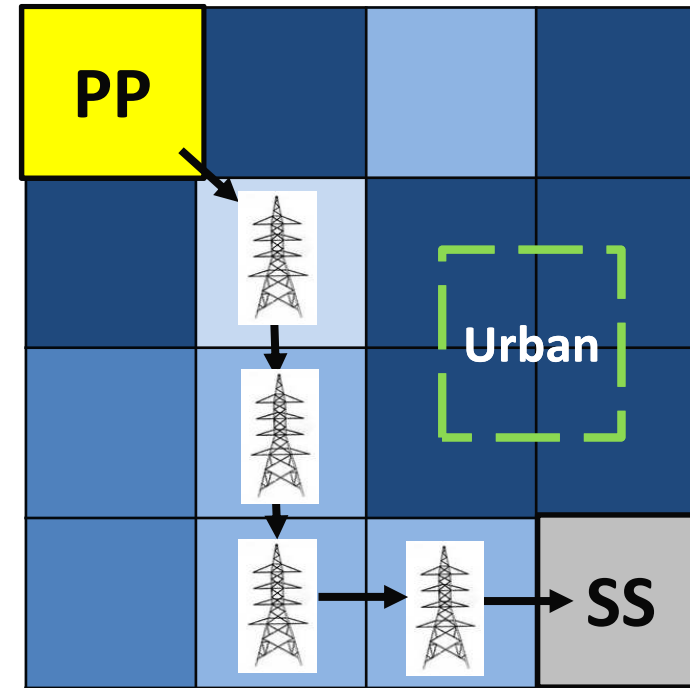


What happens if you include people's **willingness to pay** to avoid the visual disamenity of pylons?

2. Routing transmission infrastructure



WITHOUT visual disamenity

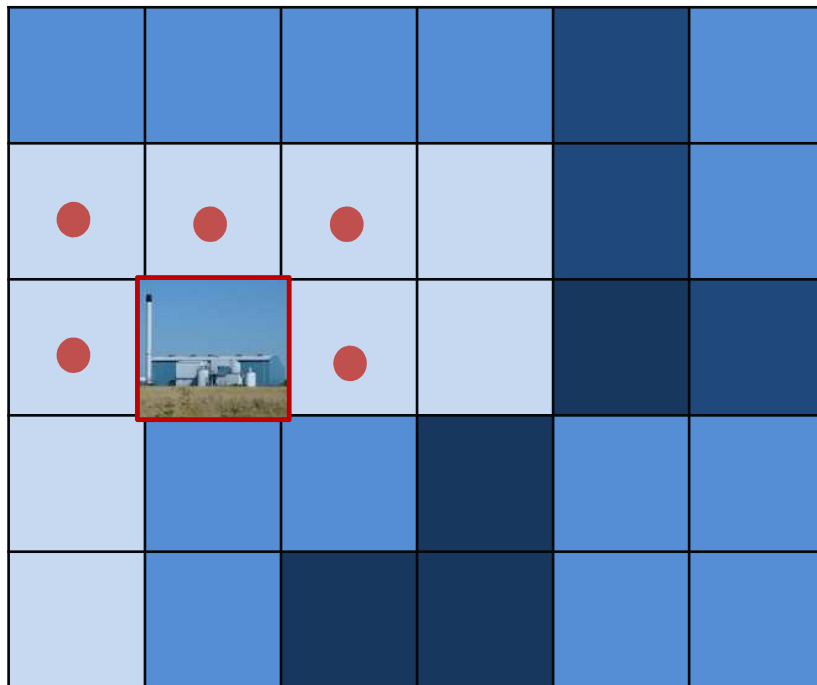


WITH visual disamenity

3. Locating bioenergy power plants AND their feedstock



Greedy Algorithm

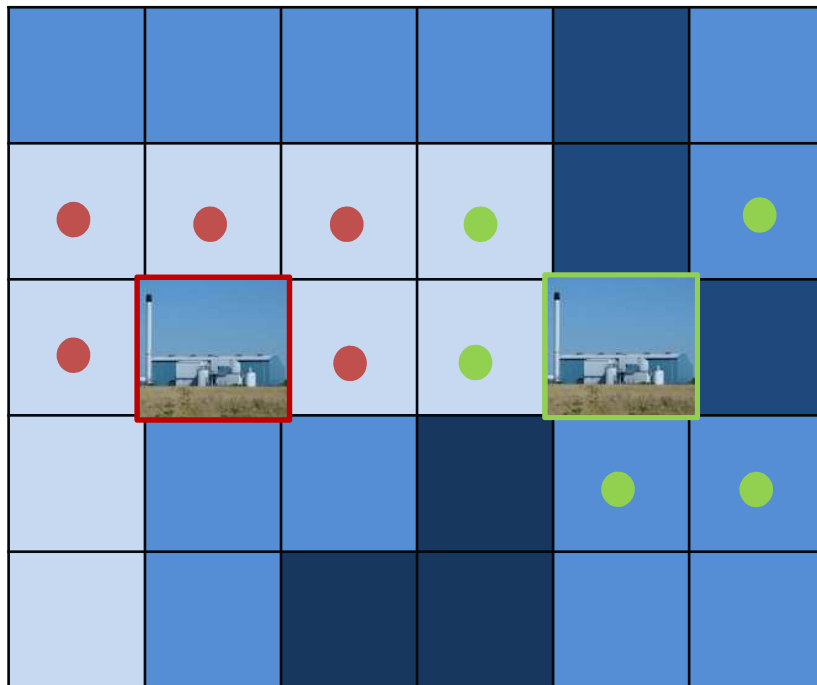


Total Cost = £

3. Locating bioenergy power plants AND their feedstock



Greedy Algorithm

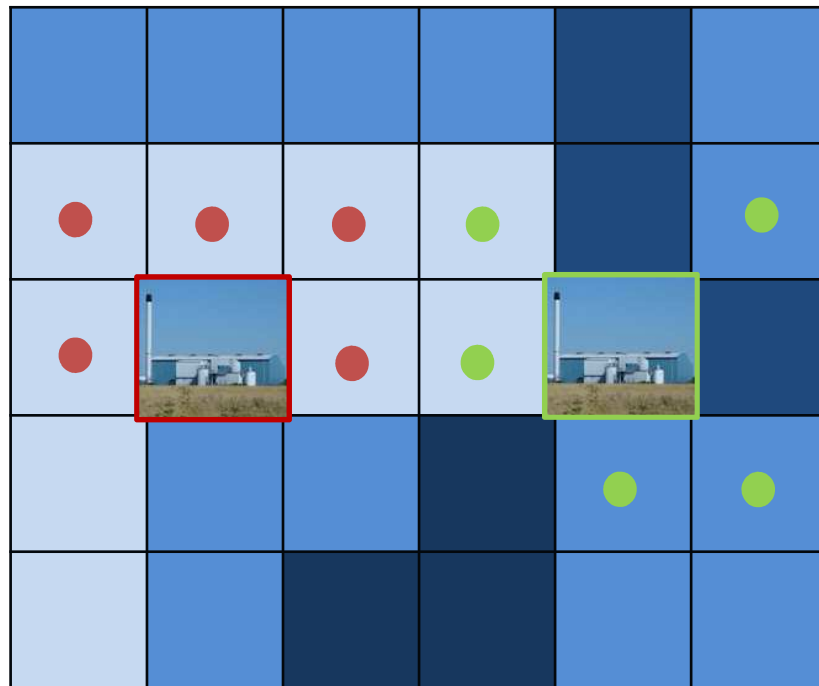


Total Cost = £££

3. Locating bioenergy power plants AND their feedstock

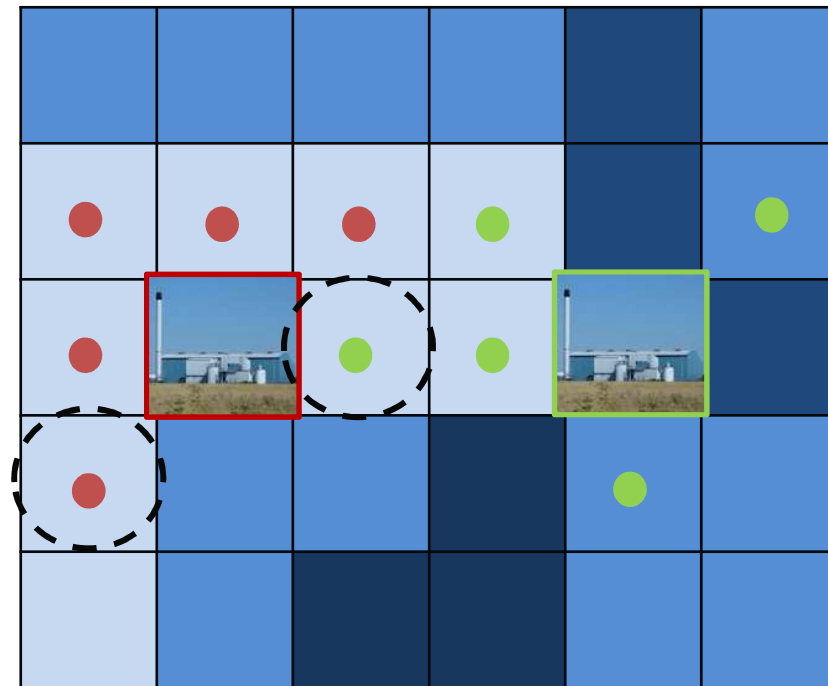


Greedy Algorithm



Total Cost = £££

Mixed Integer Linear Programming



Total Cost = ££

Forward Focus

- Siting multiple energy types
- Including temporal scales
- Including other ES impacts in the model: water, soil carbon...



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Thanks

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