

# A Big Data approach to the solar PV market: design and results of a pilot in The Netherlands

Bhavya Kausika<sup>1,\*</sup>, Wiep Folkerts<sup>2</sup>, Wilfried van Sark<sup>1</sup>, Bouke Siebenga<sup>3</sup>, Paul Hermans<sup>4</sup>

<sup>1</sup> Copernicus Institute of Sustainable Development, Utrecht University, Heidelberglaan 2, 3584 CS Utrecht, The Netherlands

<sup>2</sup> Solar Energy Application Centre (SEAC), High Tech Campus 21, Eindhoven, The Netherlands

<sup>3</sup> I-Real, Stationsweg 30, Terborg, the Netherlands

<sup>4</sup> Aurum Europe, Zandsteen 6, Hoofddorp, The Netherlands

Email: B.B.Kausika@uu.nl

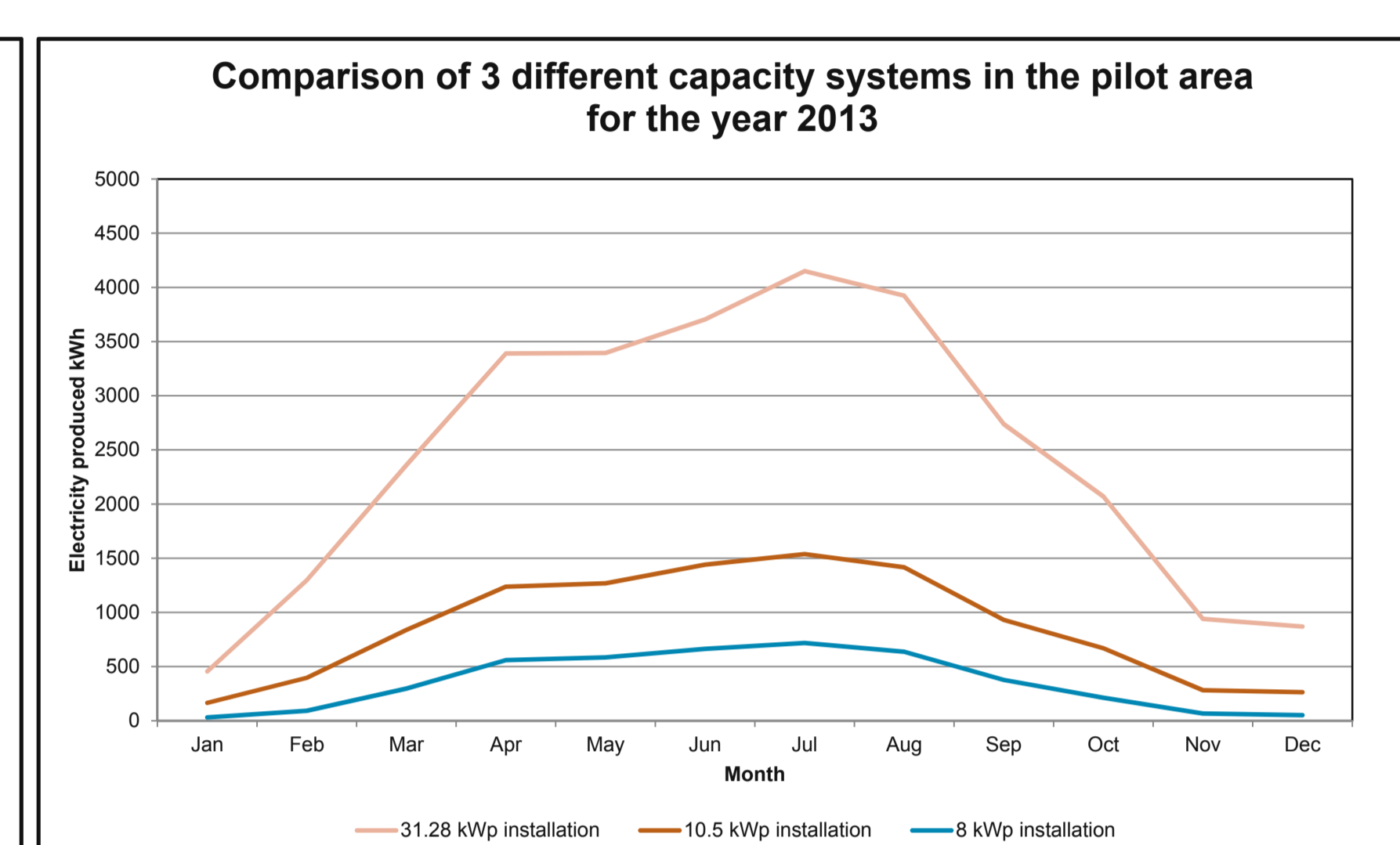
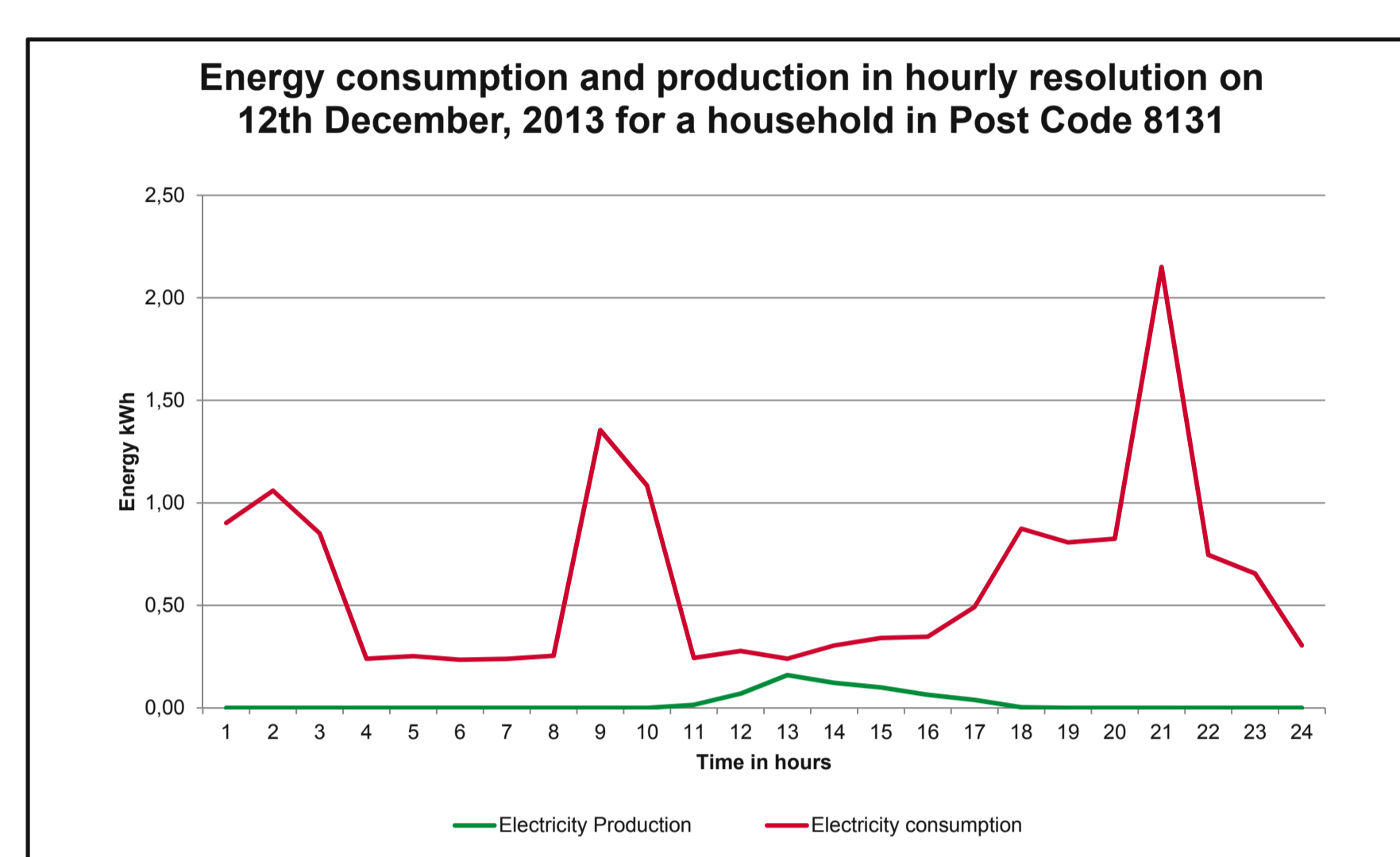
\* Corresponding author

## INTRODUCTION

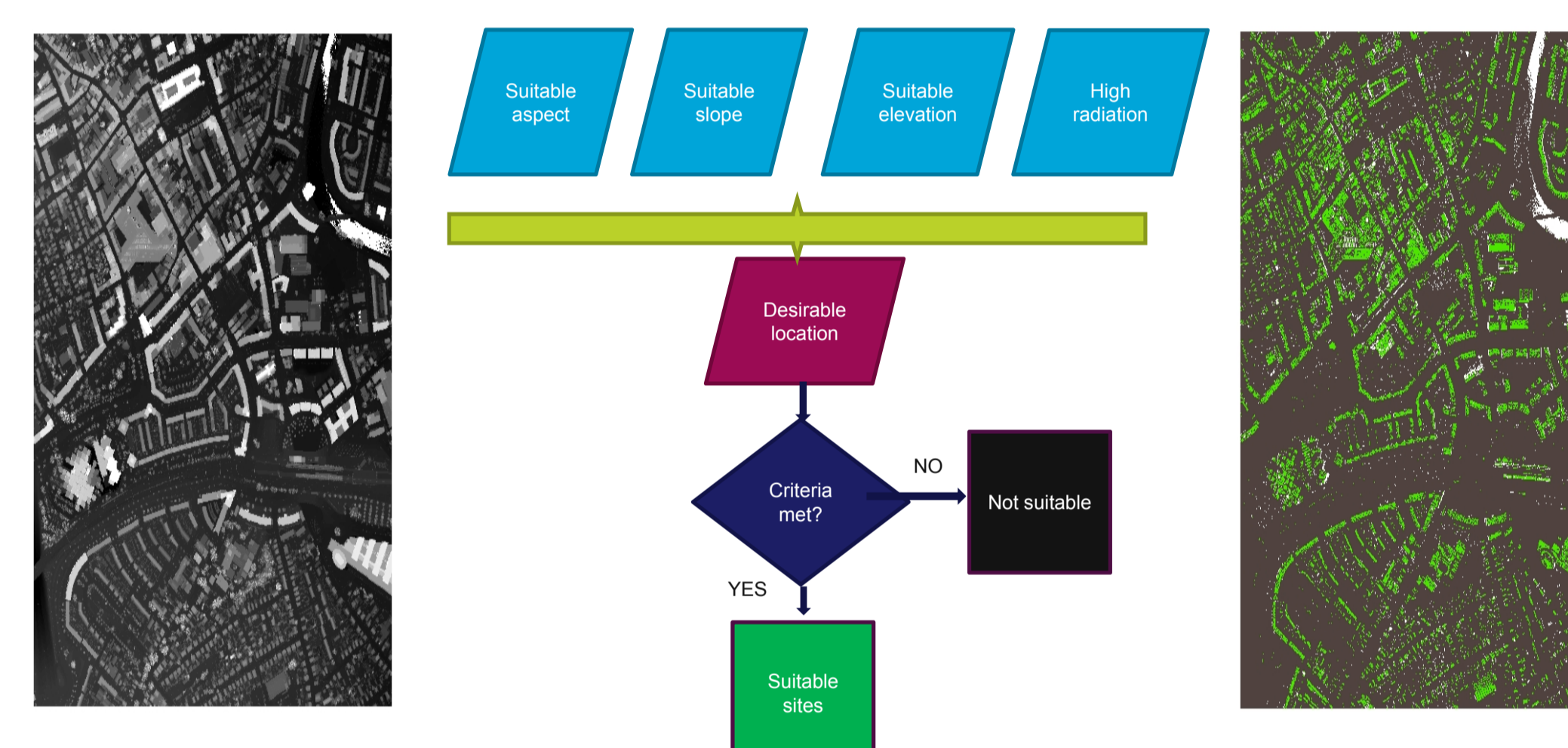
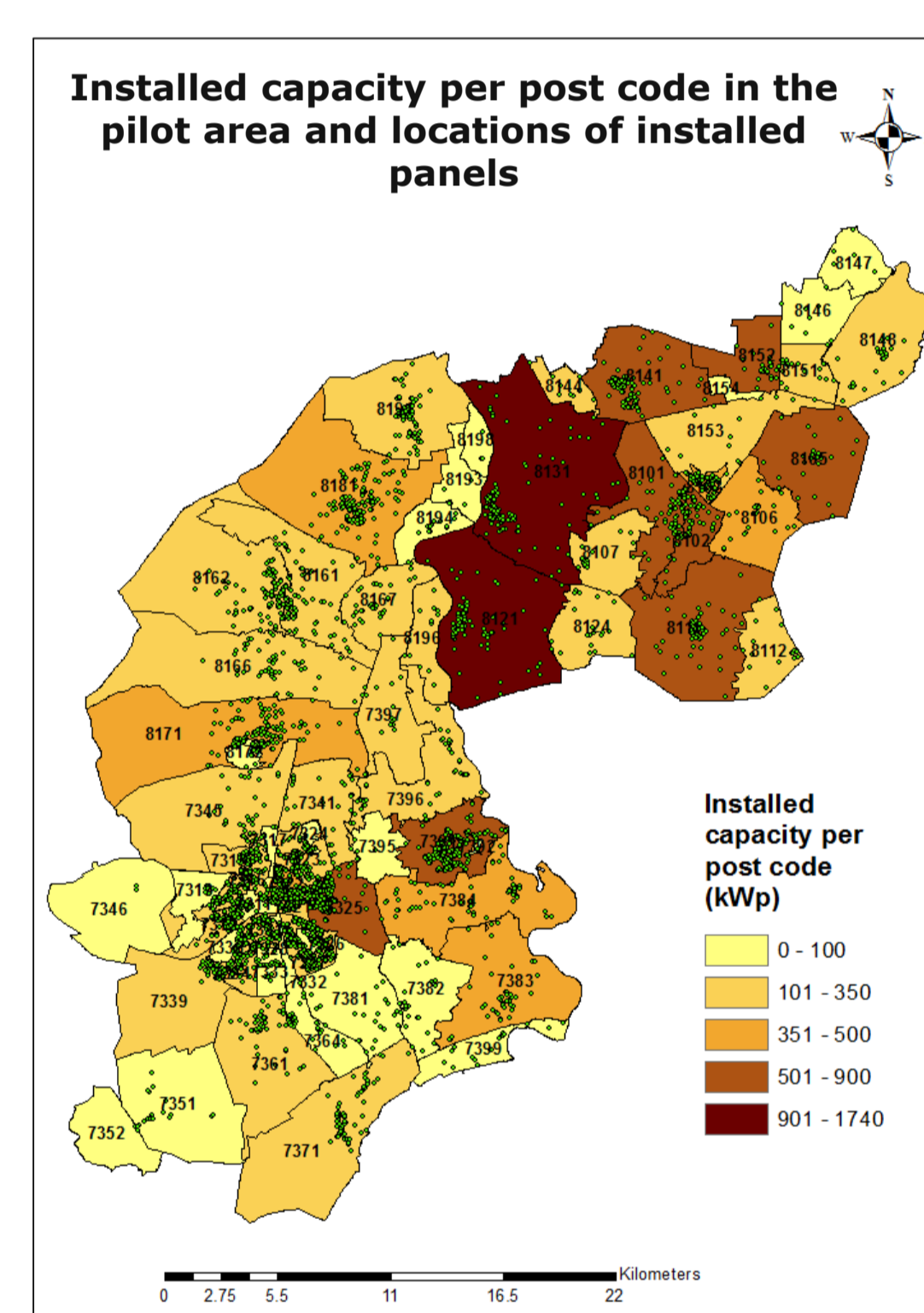
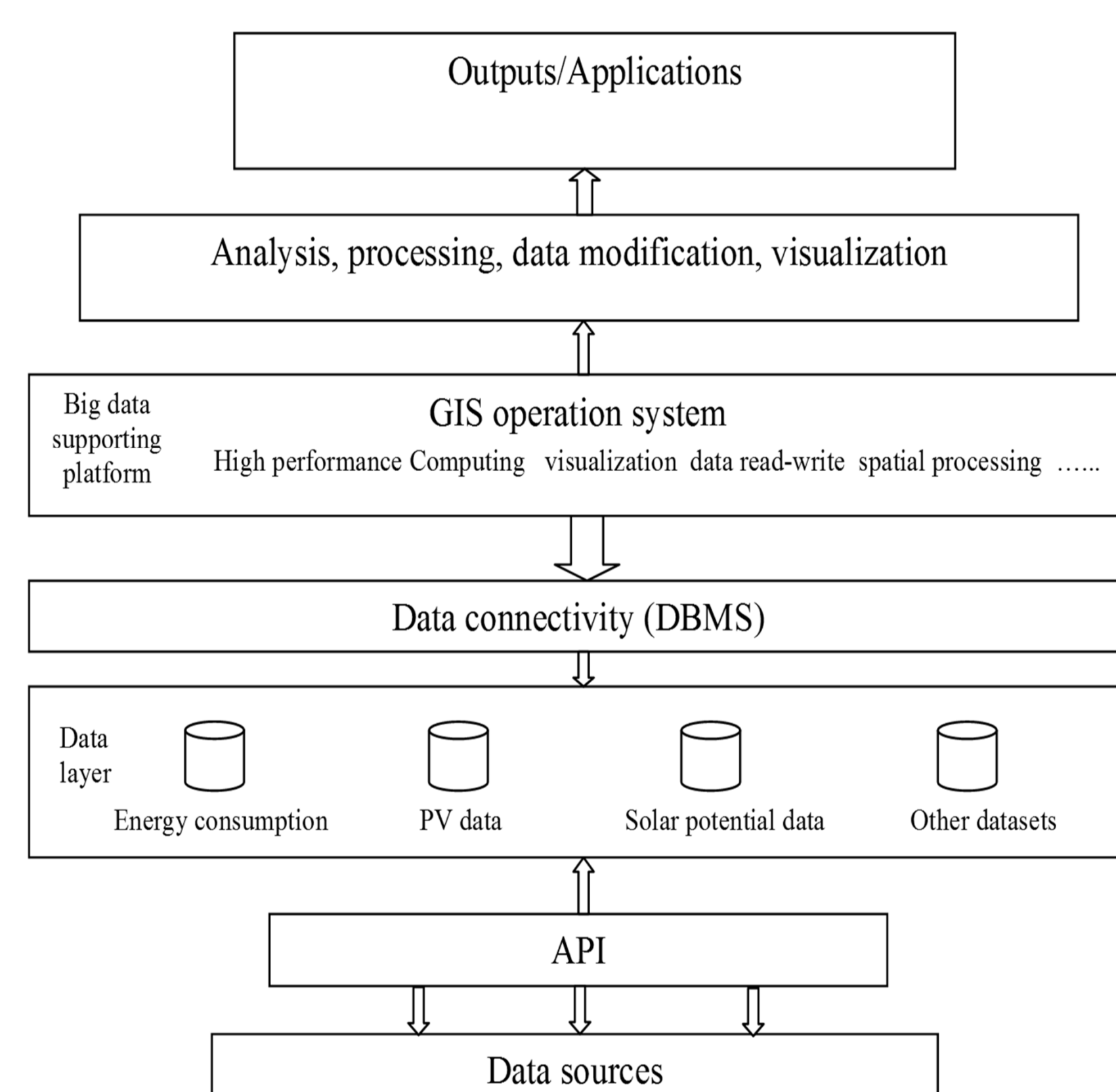
In this study, we investigate how a Big Data approach of large connected data sets can contribute to addressing supply-demand balancing. The objective of the study was to answer the following research questions

1. How is the local generation associated with local demand over time?
2. What are the possible strategies to address the cumulative supply-demand mismatch?
3. What are the appropriate strategies for time resolved balancing?

## RESULTS



## METHODOLOGY DESCRIPTION

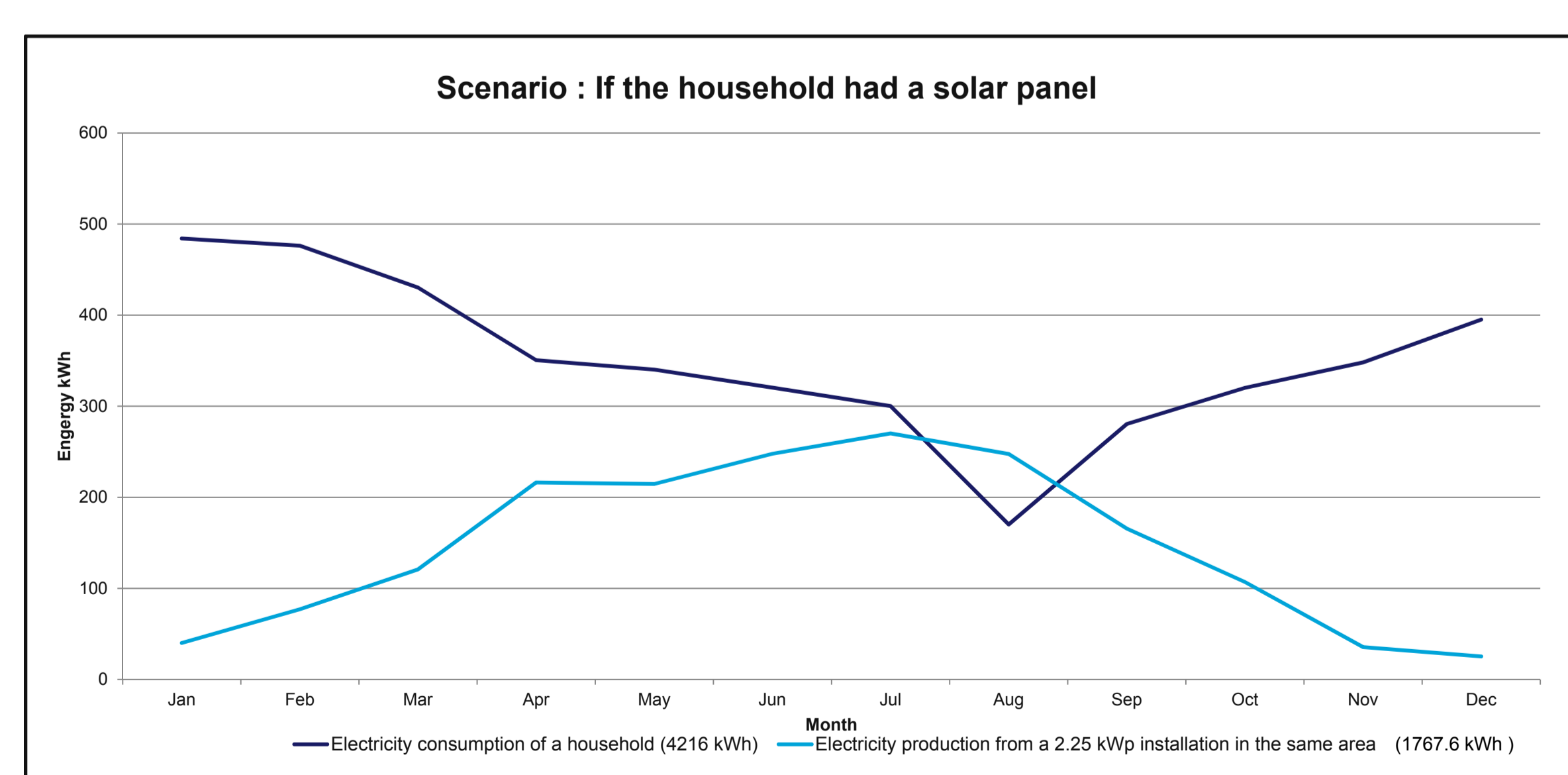


A method to find the PV potential from elevation data. This method has been used to find the potential capacity and would be implemented for future calculations.

1. Collect data
2. Create clean and useable datasets
3. Add spatial entity for visualization and analysis in GIS.
4. Make meaningful conclusions

The pilot area we chose is defined by the Dutch postal codes 73 and 81. This area covers the city of Apeldoorn and rural villages like Vaassen, Epe and Heerde. The time resolution we used is one hour, and the spatial resolution varying between household level to postal code. The analysis started with the mapping of installed systems, capacity and production, building information, digital elevation models, solar potential and electricity consumption.

	No of buildings	Buildings with installations	Present Installed capacity	Potential capacity	Present Electricity consumption	Potential PV production
Test Run on 1.25 sq km	4000	21	0.06 MWp	3.6 MWp	14,000 MWh	3,150 MWh
Total Pilot Area	29,2764	3,828*	17.55 MWp	430 MWp	950,848.5 MWh	376,250 MWh



## Interim Conclusions

We were able to bring for the pilot area data sets from different sources onto the same GIS base. It was found that about 1.61% of the total electricity consumption is covered by PV in the pilot area for the domestic sector. Therefore, there is scope for filling this gap. Grid operators would have to keep track of all the ongoing installations and be able to manage the feed-in and the consumption and consumers will be able to understand and forecast the generation of solar power as a function of place and time which will enable smooth management of supply and demand. We performed a new analysis of PV potential based on the AHN elevation data. The roof potential is not large enough for 100% coverage of the electricity demand. About 39% coverage can be achieved by rooftop PV. Time resolved balancing will require a combination of demand steering (variable tariff setting) and storage.

\* data acquired from PIR (Rijkswaterstraat, Ministry of Infrastructure and the Environment, Netherlands), AURUM and SOLAR CARE .