Extent of Solar Powered Irrigation Systems (SPIS) in South Africa

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ARC • LNR
Exellence in Agricultural Research and Development

WATER RESEARCH COMMISSION

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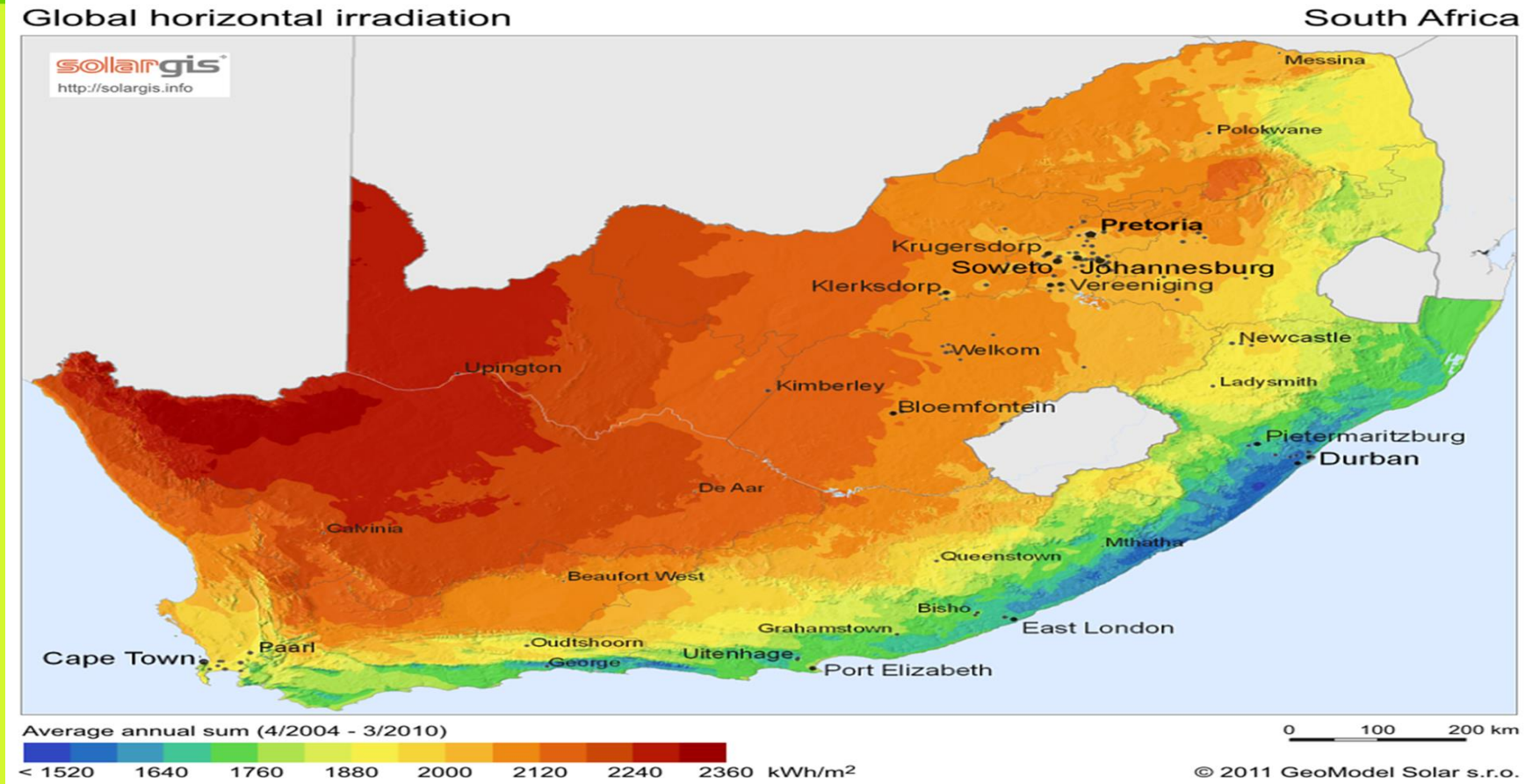
Introduction

- Fossil fuels are a major contributor to carbon based pollution & climate change
- Large amounts of solar energy enters the earth's surface (Kelly et al, 2010)
- Potential for solar energy in South Africa is high (Chang et al, 2011, FAO, 2015)
- In SA, agricultural sector consumes 50 - 60 % of water, and
- 8 % of the total electricity (DoE,2012)
- Irrigation sector consumes 60% of water (Writer, 2015)
- SA has experienced load shedding, which has affected many farmers

Introduction… cont



Problem Statement

- Irrigation consumes the most electricity in the agricultural sector
- In the past, SA has experienced load shedding and is now experiencing increased electricity prices
- There is a lack of research done on SPIS implementation in South Africa

Research Objective

- To determine the extent of SPIS in SA and the characteristics of these systems

Hypothesis

- The extent of SPIS in SA, as well as the characteristics, of the systems will be determined

Methodology

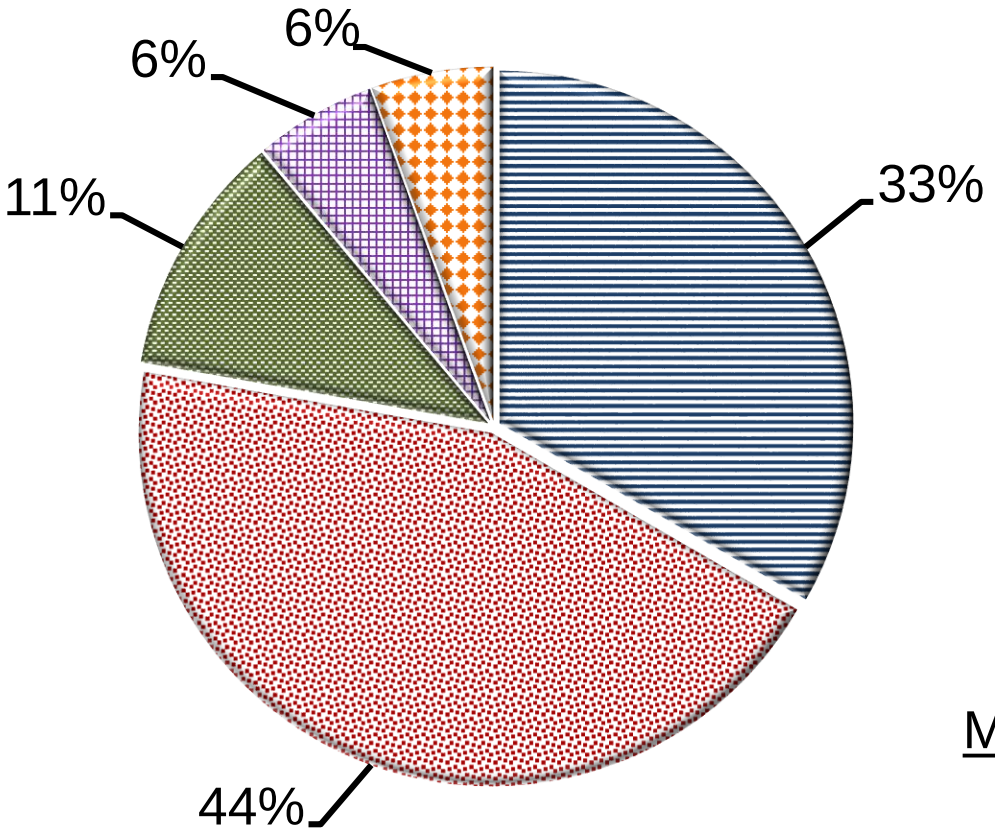
- Application for ethical clearance was done with the University of KwaZulu Natal Research Office
- Four groups of stakeholders were targeted which included:
  - SPIS users,
  - SPIS engineers, installers and suppliers,
  - Potential SPIS users, and
  - Former SPIS users
- An online questionnaire was developed with the use of SurveyMonkey®

Methodology… cont.

- Data collection conducted through:
  - Calls to practising agricultural engineers working in consulting companies and government departments
  - SA Irrigation Institute (SABI) & the SA Institute for Agricultural Engineers (SAIAE) sent links to the questionnaire to their members
  - Attended a training programme at Franklin Electric
  - Links to Farmer's Weekly magazine were sent
  - Internet searches for documentation on implemented SPIS

Results

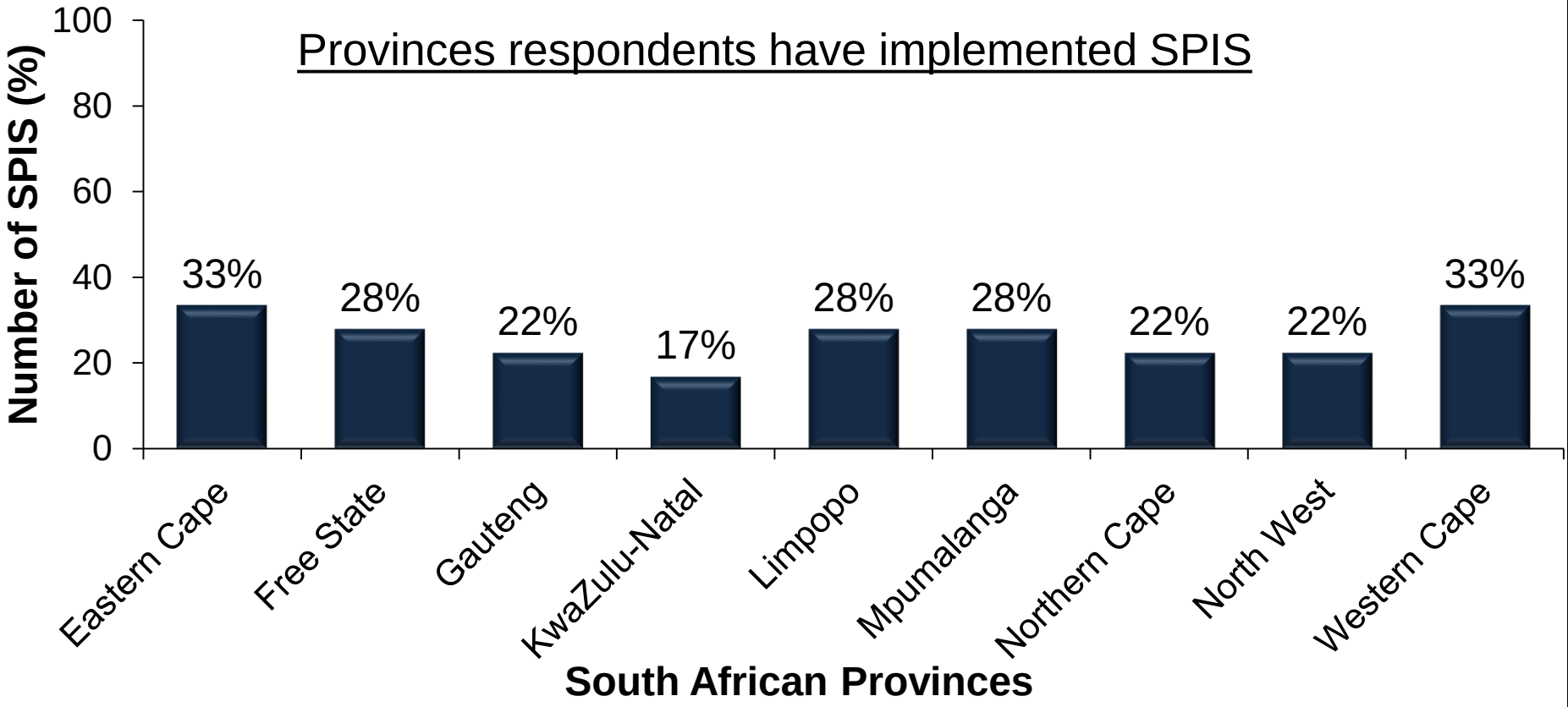
SPIS engineers, installers and suppliers



Main type of farm respondents implement SPIS for

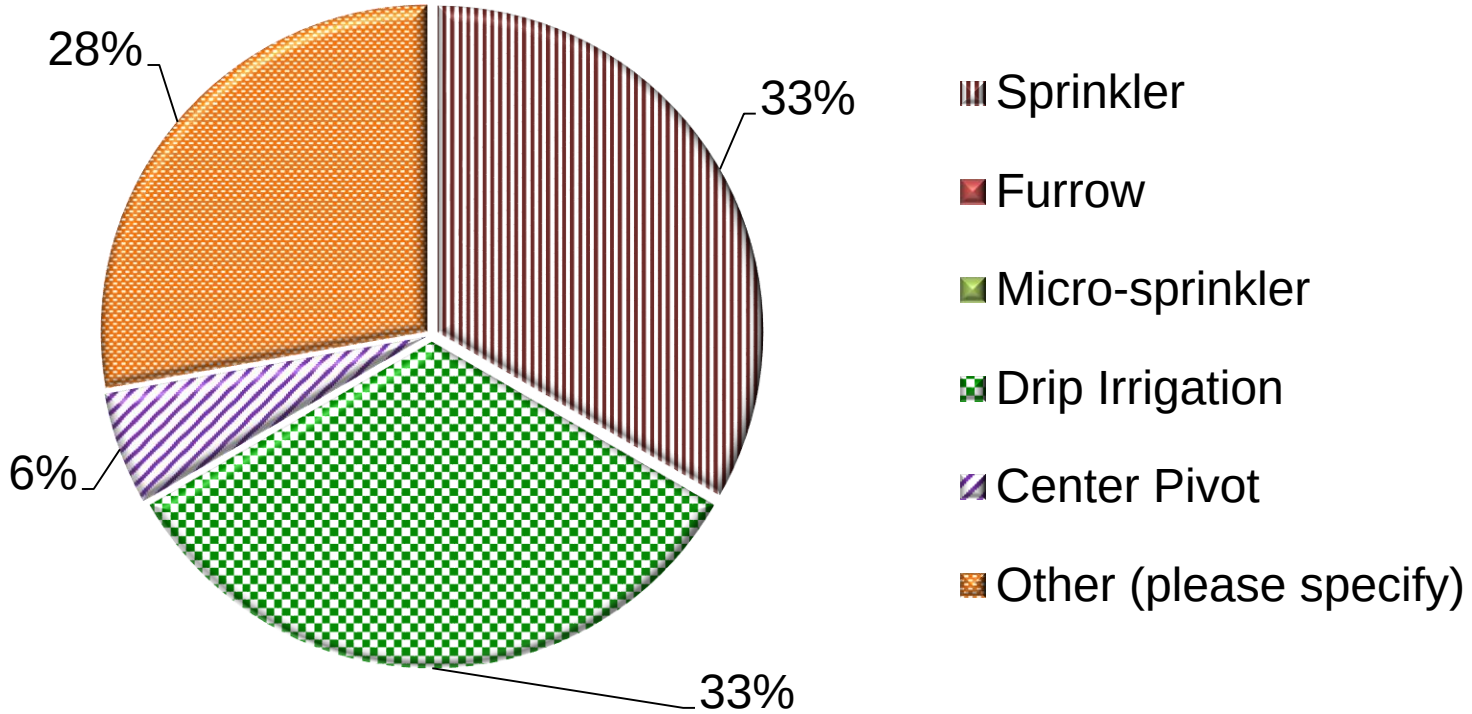
Results…cont

SPIS engineers, installers and suppliers



Results… cont

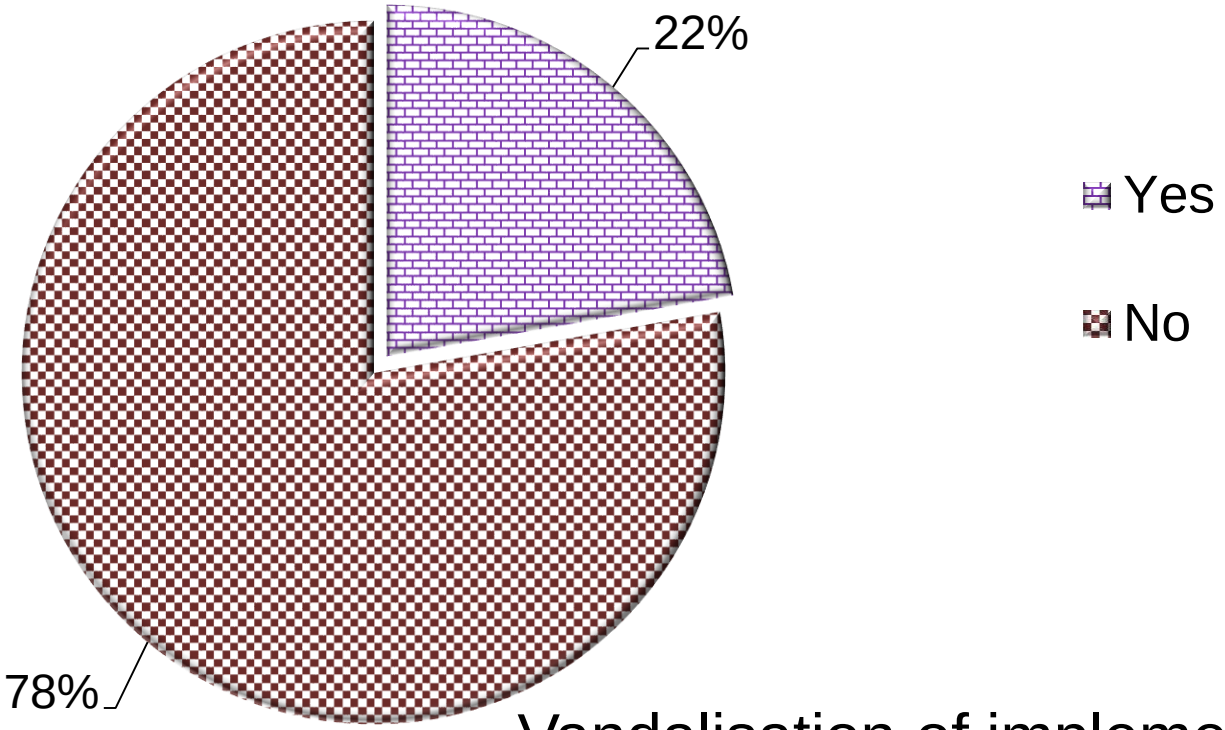
SPIS engineers, installers and suppliers



Types of irrigation systems the respondents mainly implemented

Results…cont

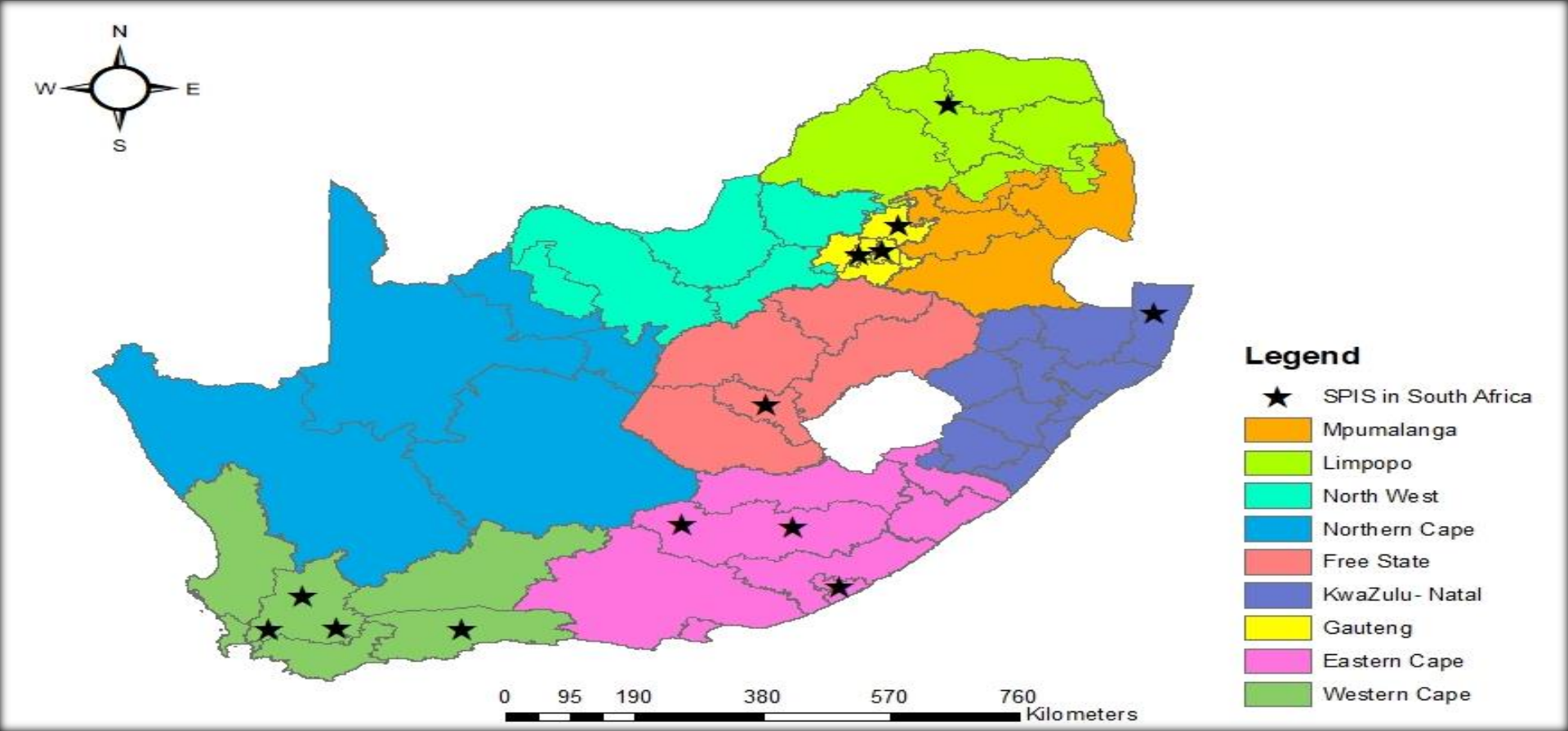
SPIS engineers, installers and suppliers



Vandalisation of implemented SPIS

Results…cont

SPIS users



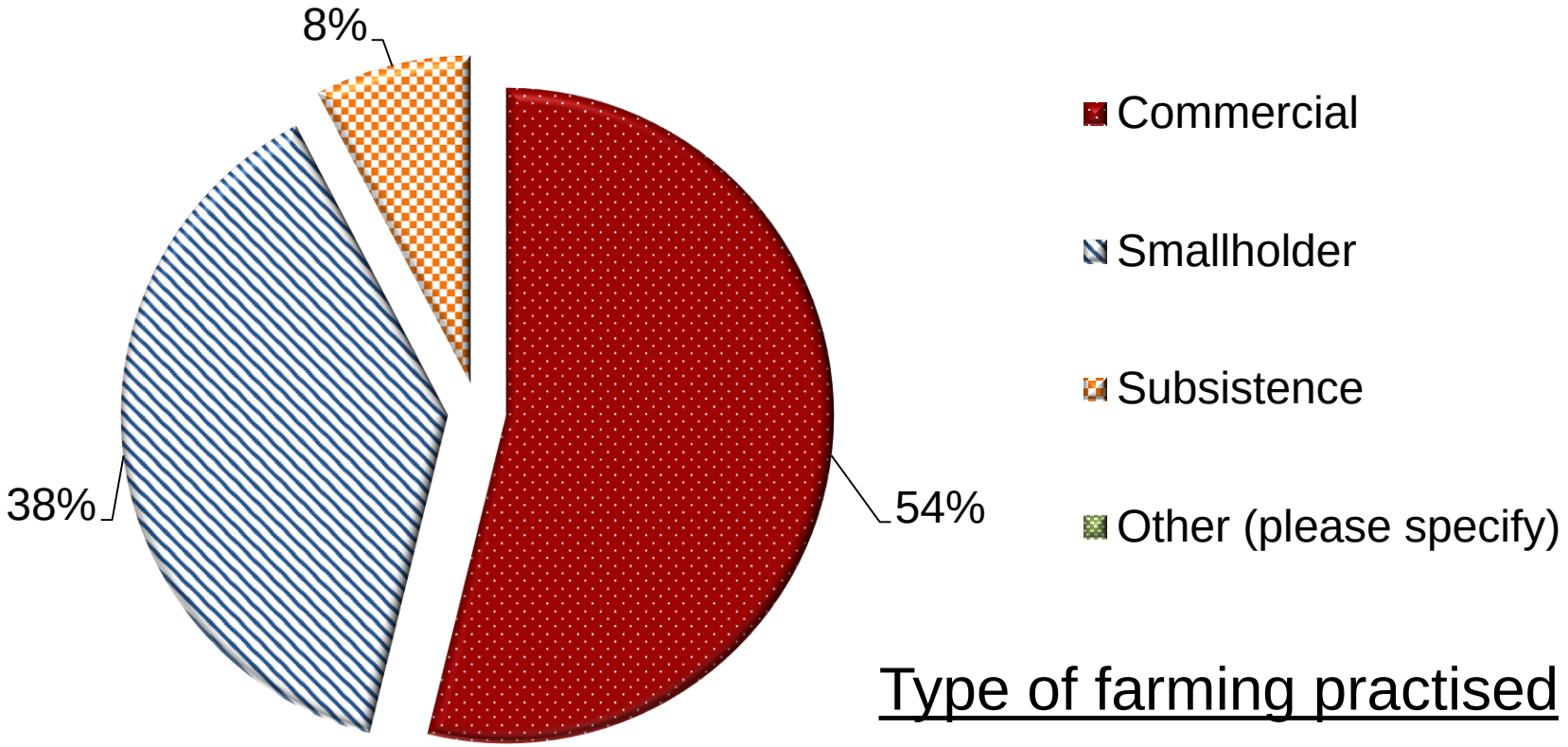
Results…cont

SPIS users

Number of SPIS	Province	Municipality/ Metropolitan	Farm Size (ha)
1	Free State	Mangaung Metropolitan	4.28
2	Limpopo	Capricorn District	0.135
3	Western Cape	Eden District	41
4	Western Cape	Eden District	60
5	Western Cape	Cape Winelands District	140
6	Western Cape	Cape Winelands District	35
7	Eastern Cape	Buffalo City Metropolitan	12
8	Gauteng	Ekurhuleni Metropolitan	2
9	Western Cape	Cape Winelands District	48
10	Gauteng	City of Tshwane Metropolitan	4
11	Gauteng	City of Johannesburg Metropolitan	Not Specified
12	Eastern Cape	Chris Hani District	10
13	KwaZulu- Natal	Zululand District	8
Total Area			**364.415**

Results…cont

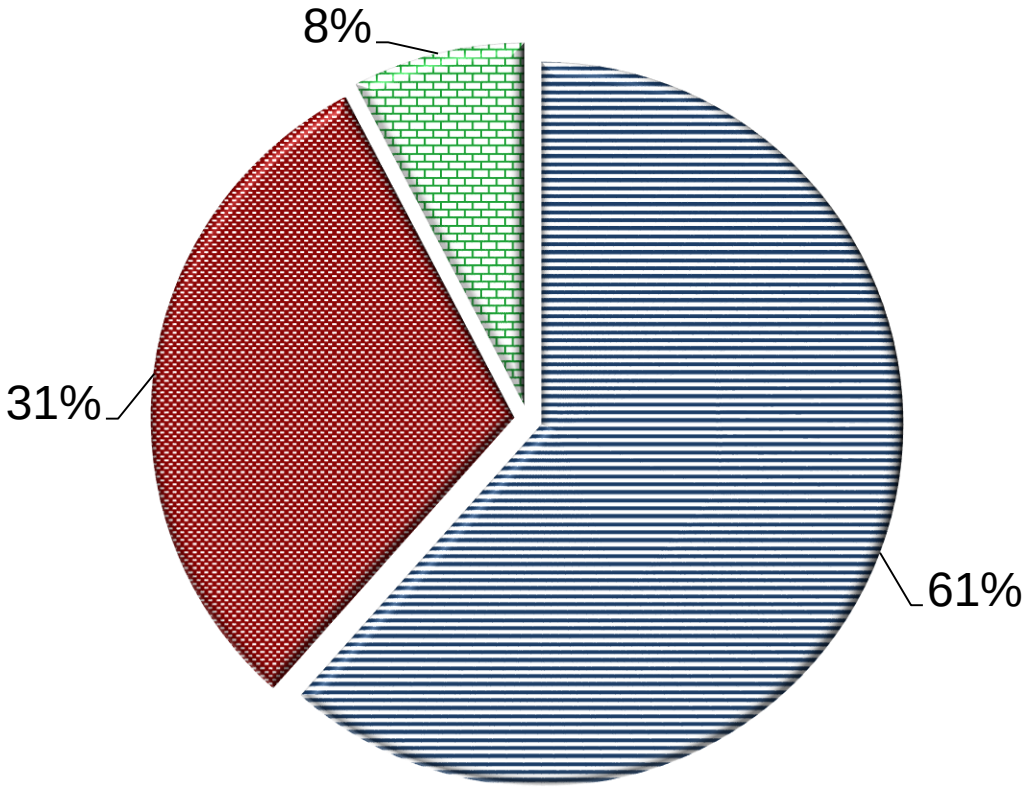
SPIS users



Type of farming practised

Results…cont

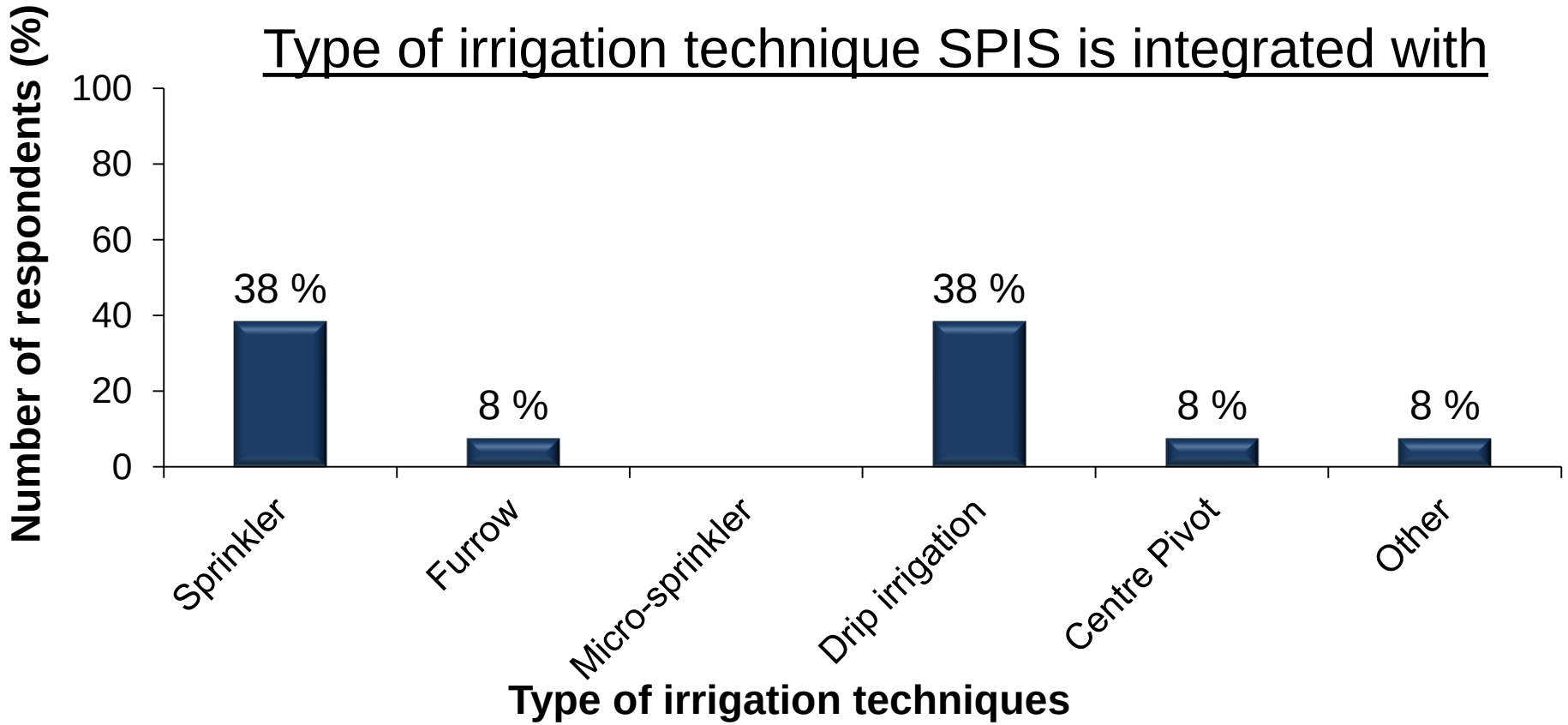
SPIS users



Type of water source

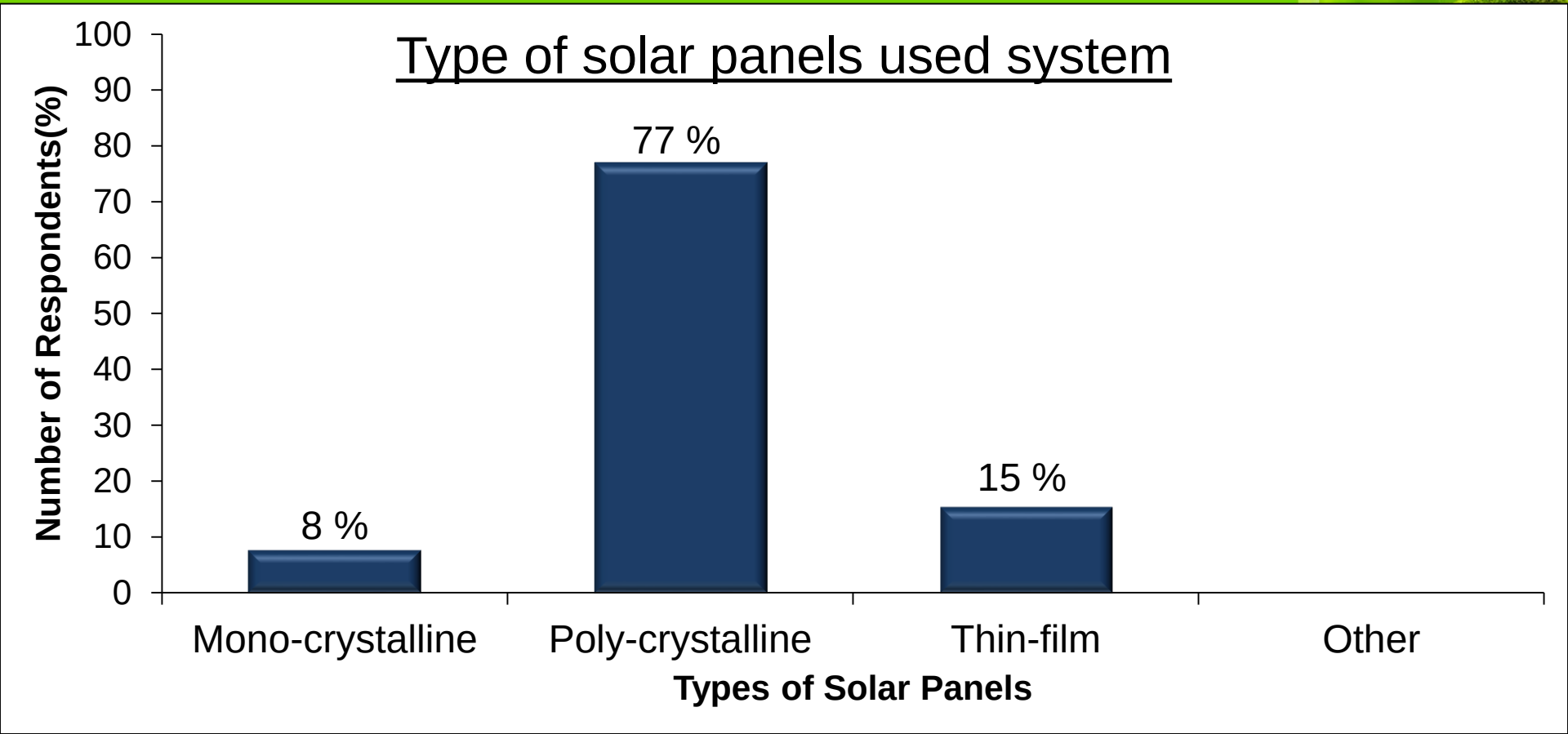
Results…cont

SPIS users



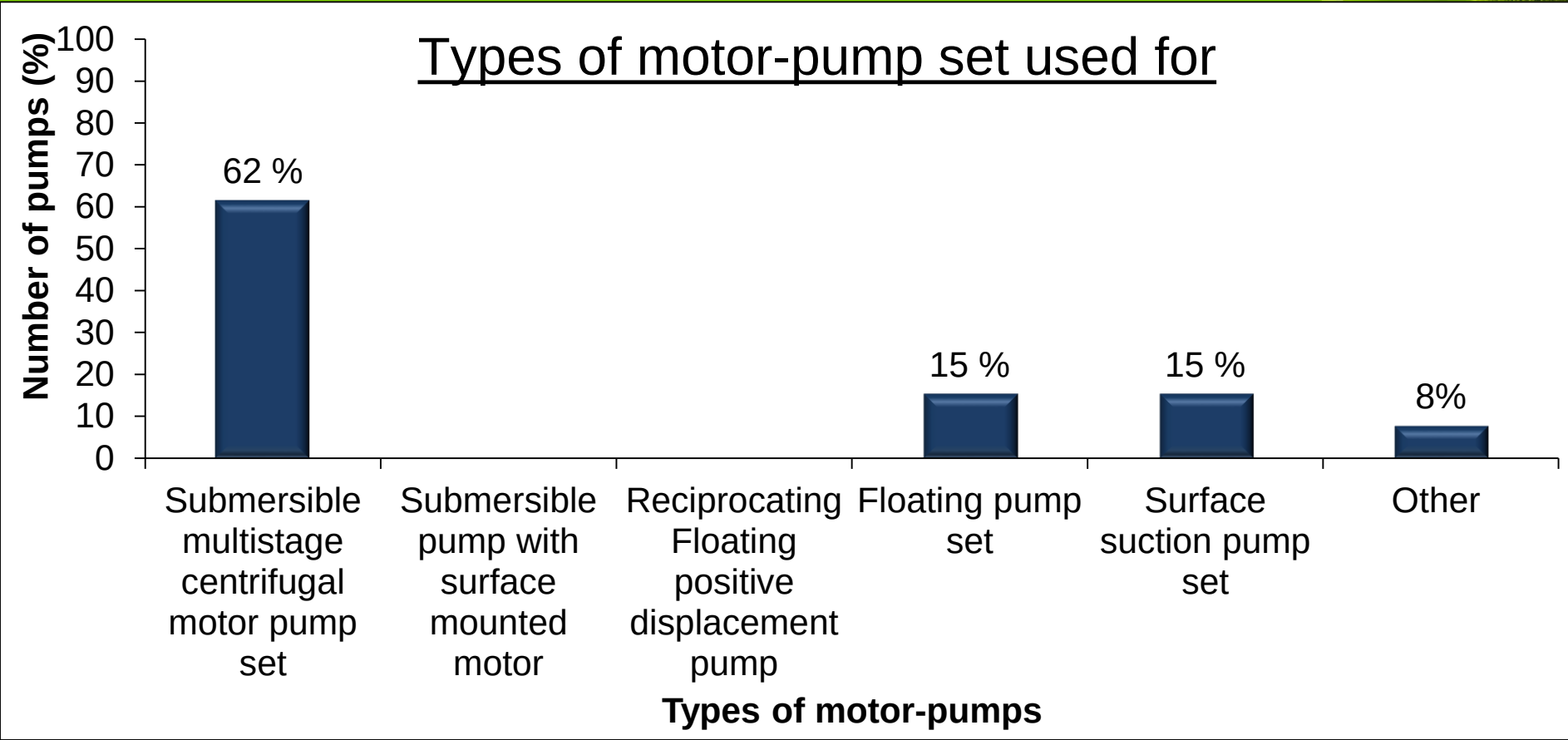
Results…cont

SPIS users



Results…cont

SPIS users



Conclusion and Recommendations

- The Western Cape was found to have the most SPIS
- The main reason SPIS users switched from grid electricity to solar was for energy independence
- SPIS is feasible in South Africa as most SPIS users that participated in the survey are commercial farmers
- Polycrystalline solar panels are commonly used in the country
- Sprinkler and drip irrigation techniques are mainly integrated with SPIS

Conclusion and Recommendations…cont

- The submersible multistage centrifugal motor-pump set is primarily used in SPIS
- An idea of the extent of SPIS in South Africa and the characteristics of SPIS was acquired
- Visitation of SPIS engineers, installers and suppliers should be planned and done

Acknowledgements

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- Supervisors: Dr Senzanje and Dr Dhavu
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THANK YOU