

# Air pollution in dense low-income settlements in South Africa:

Research synthesis carried out on behalf of the  
ROYAL DANISH EMBASSY and the DEAT

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environment  
& tourism

Department:  
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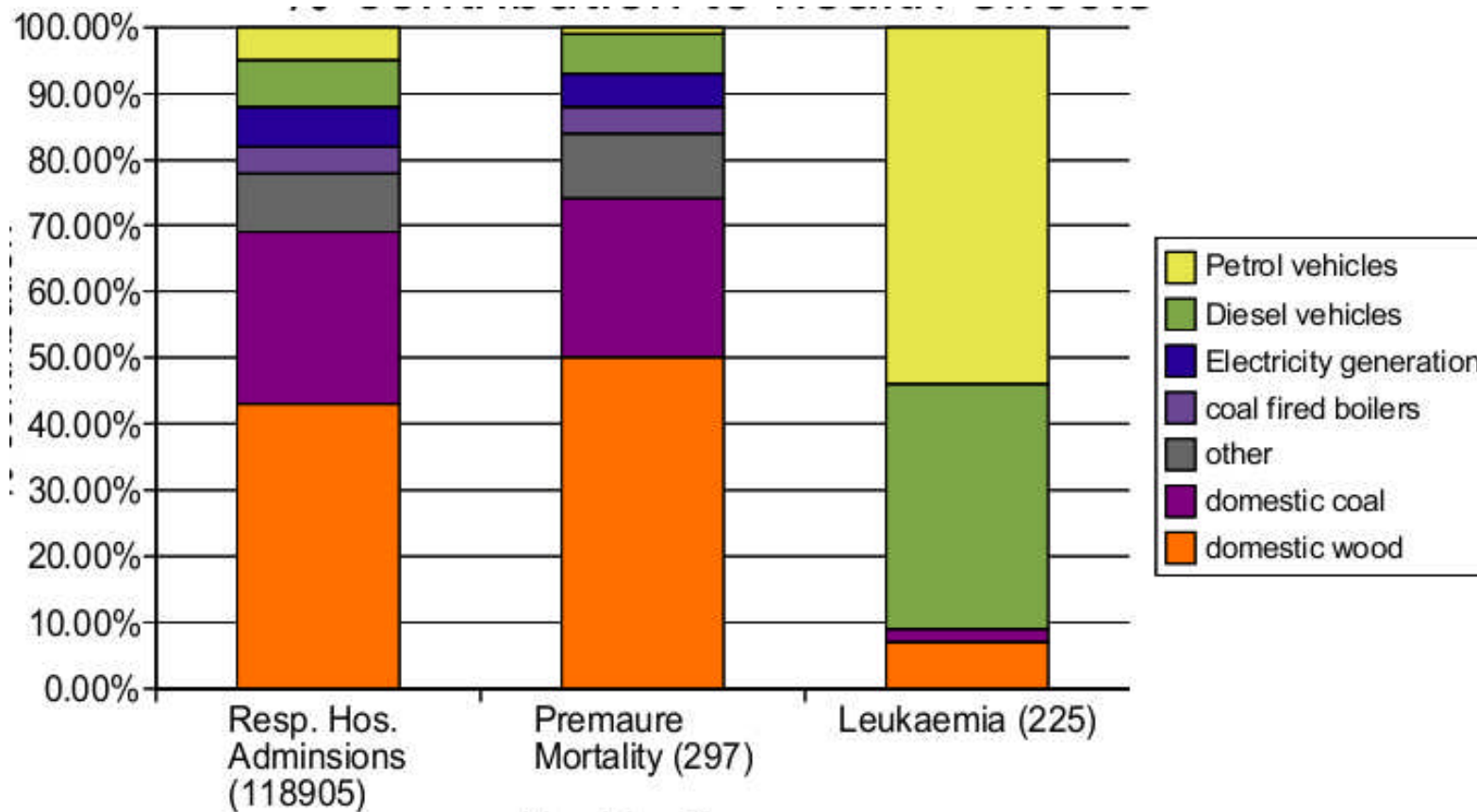
# Purpose and scope

This research was carried out on behalf of DANIDA as part of the Urban Environmental Management Programme in cooperation with the South African Department of Environmental Affairs and Tourism.

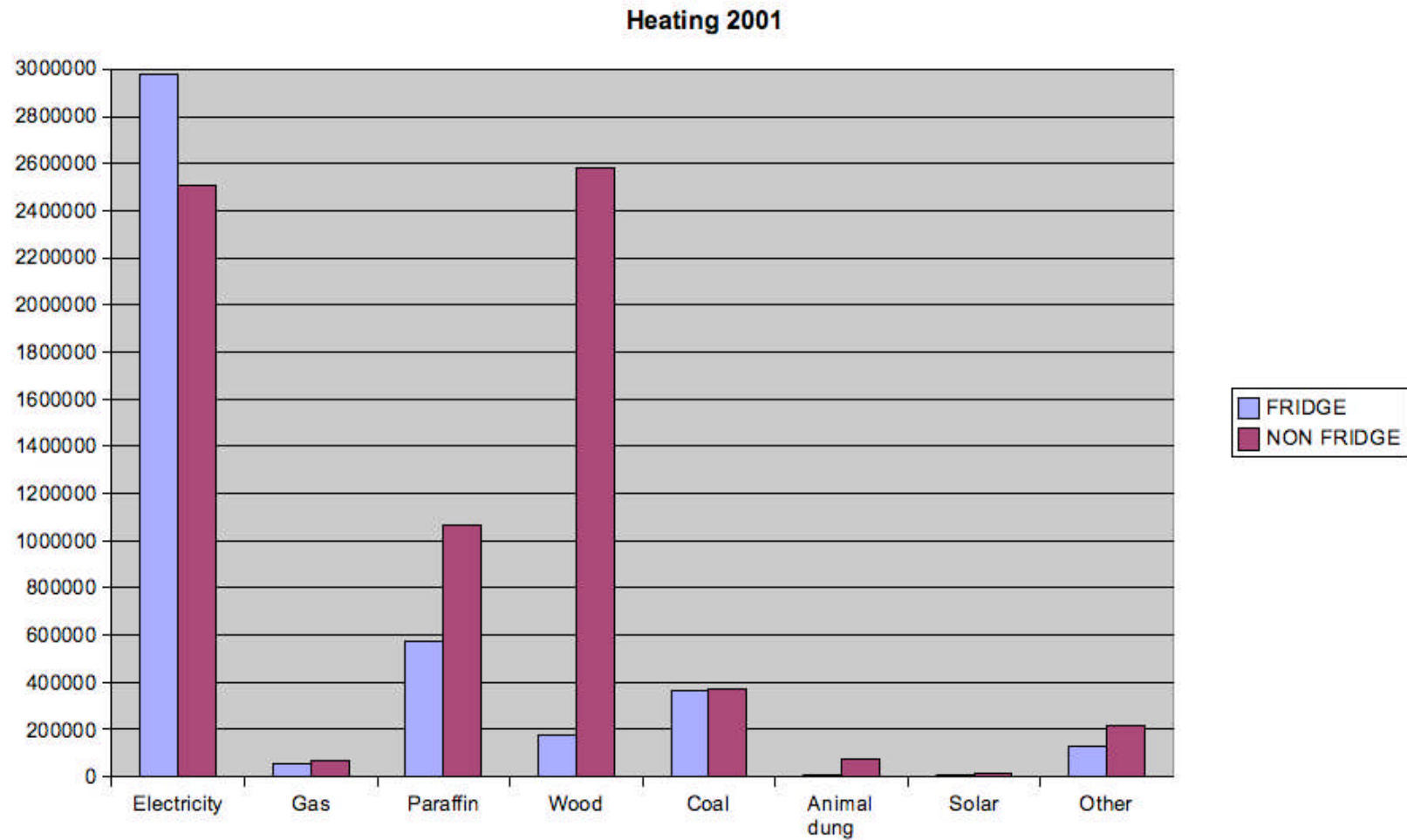
- Air pollution in dense, low-income communities is acknowledged as a major threat to the health and well-being of people in low income communities
- Research into the problem, cause and effect relationships, possible solutions and the impact of interventions has been sporadic, uncoordinated, piecemeal and narrowly focused
- With a view to developing an Integrated Strategy and Action Plan to address this problem, there is a need to synthesise the findings and to draw out useful conclusions and recommendations.

# Fuel usage in dense, low-income communities and the comparison to national residential fuel usage

The significance of air pollution from domestic sources : From the FRIDGE (2004) study, only in major urban areas



# Conclusion: The extent of the problem



# Comparison of 2001 Census with the 2006 *General Household Survey*

## Cooking:

Electricity: 5.7 million to 8.3 million

Paraffin: 2.4 million to 1.85 million

Wood: 2.3 million to 1.9 million

Coal 0.31 million to 0.15 million

## Heating

Electricity: 5.5 million to 6.5 million, but same percentage

Wood: 2.76 million to 2.63 million (25% to 20%)

Paraffin 1.62 million to 1.77 million, same percentage

Coal 0.73 million to 0.6 million

# Comparison of 2001 Census with the 2006 *General Household Survey*

Although the number of households with electricity has increased by almost a million households, **the relative percentage of households who use electricity for heating has remained the same.**

- **Wood use remains relatively stable in absolute terms but is decreasing in comparison to other energy sources.**
- The third most popular energy source was **paraffin** (14.65% or 1.64 million of households used paraffin in 2001). **As a proportion of households, paraffin use remains stable.**
- In 2006 only 599 000 households (4.6%) used **coal**. In absolute terms this is a significant decrease (20%) from the 734 000 reported in 2001. It is also a drop in percentage terms from 6.55% in 2001.

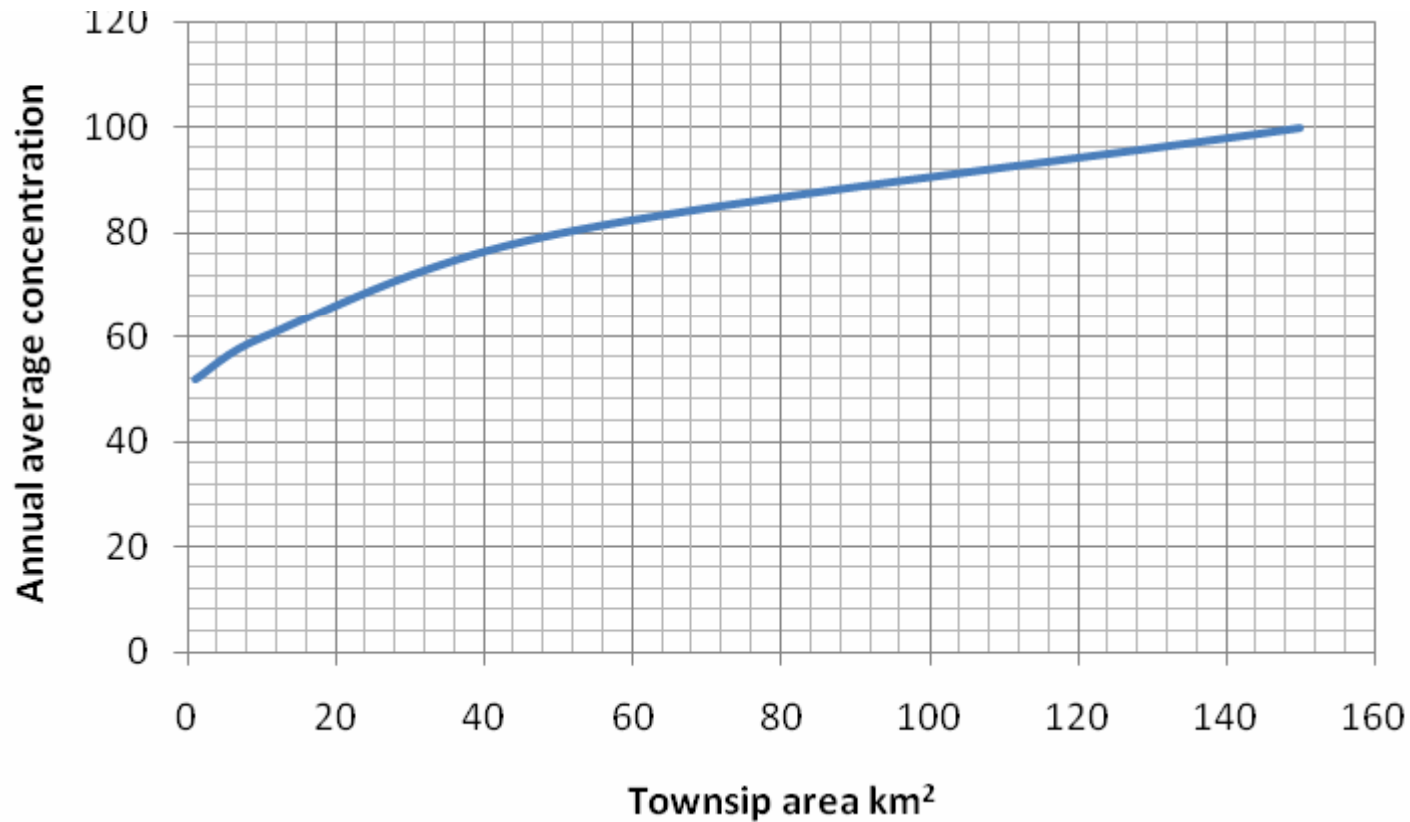
# Conclusion: The extent of the problem

Domestic sources of air pollution has by far the largest impact of health of any category of pollution sources.

There is a significant possibility that the impact of air pollution may be underestimated.

- This study has found that the size of a settlement has only a limited influence on the level of air pollution.
- This means the there are literally thousands of settlements where ambient air pollution may have significant negative health effects that is not included in the calculation of deaths caused by air pollution.

# PM10 concentration vs township size (uniform emissions)



# Conclusion: Fuel mix

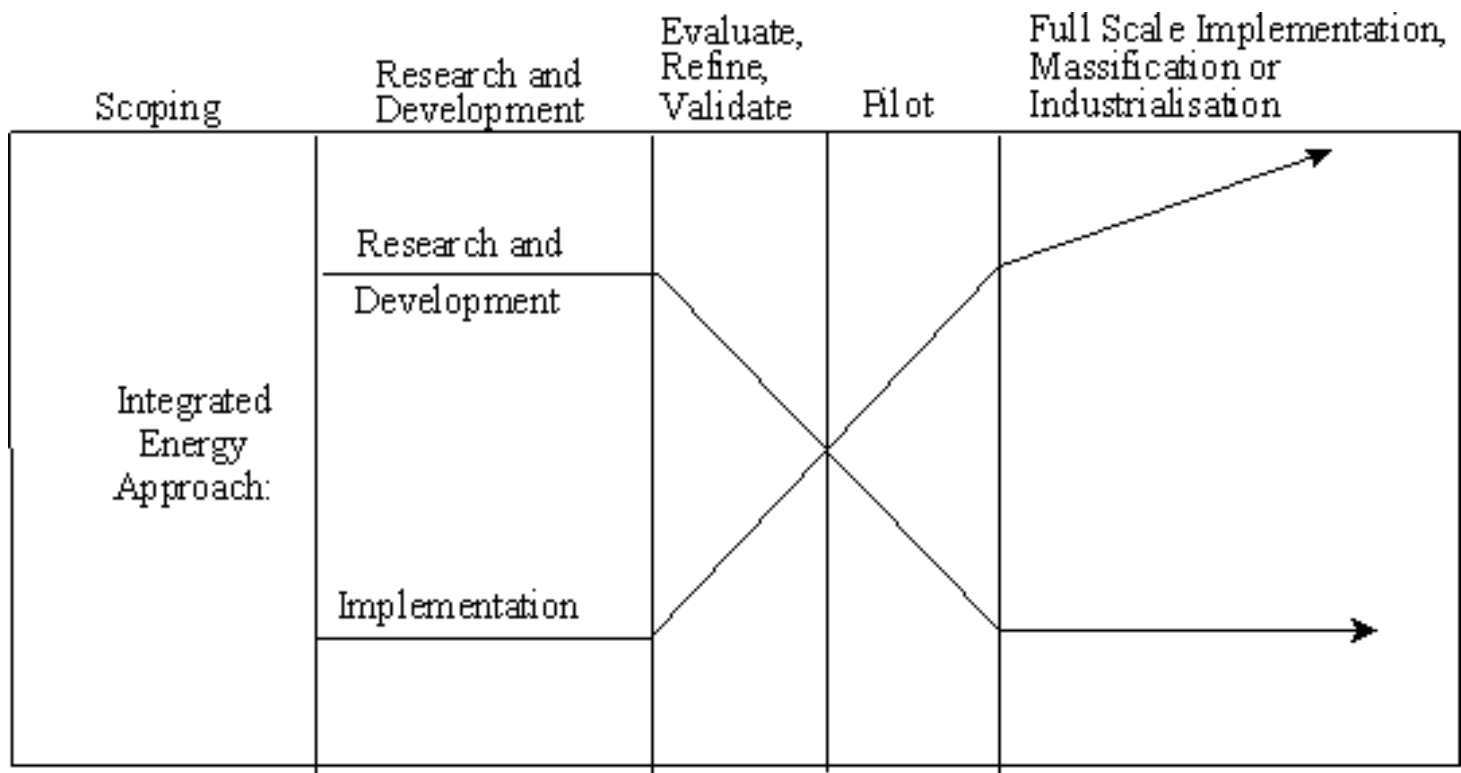
The study found that households in low income communities use a mix of energy carriers to satisfy their heating and cooking requirements. This implies that **there may not be one single solution** but also that households will switch between energy carriers as it suits them.

This means that **new possibilities that really meet user requirements** have a good chance to penetrate the market.

It is further clear that the need for **space heating is a major driver of winter time pollution** to which a systematic solutions is urgently needed

# Interventions: Stages of development

The relationship between research and implementation through the product development cycle



# Conclusion: Tested interventions

## Interventions that have reached the massification stage

- **Basa njengo Magogo** : Well managed projects lead to drastic improvements.
- **Energy efficient housing** : Off-the-shelf technology.
- **Safer paraffin appliances** : Safety standards are now enforced by law

## Interventions ready to be piloted

- **Solar cookers** : Research has shown desirability but no interest in commercialising.

## Interventions ready to be improved and verified

- **Domestic biogas** : Needs a social breakthrough in SA conditions.

## Interventions researched and ready to be evaluated:

- **New generation energy efficient houses** : Potentially reduce all space heating energy use and associated pollution.
- **Biomass gasification stoves** : Prototypes show great promise.

## Interventions been evaluated but found to have flaws

- **Gel fuels** : High emissions, poor devices and low energy.

# Conclusion: Indications for further research

Areas that have to be researched and developed further

**Improved top down ignition of wood fires** Wood fires can also be ignited top-down with a corresponding reduction in wood use and emissions. The exact method and how this method is to be disseminated needs research. There is a need for more information on wood burning devices and techniques.

**Rural areas and small towns** Monitoring may provide very valuable information

**Indoor air quality** Very little information

**Wood use** Very little information

**Multi-factorial causation of air pollution** Interaction of social and technical factors