

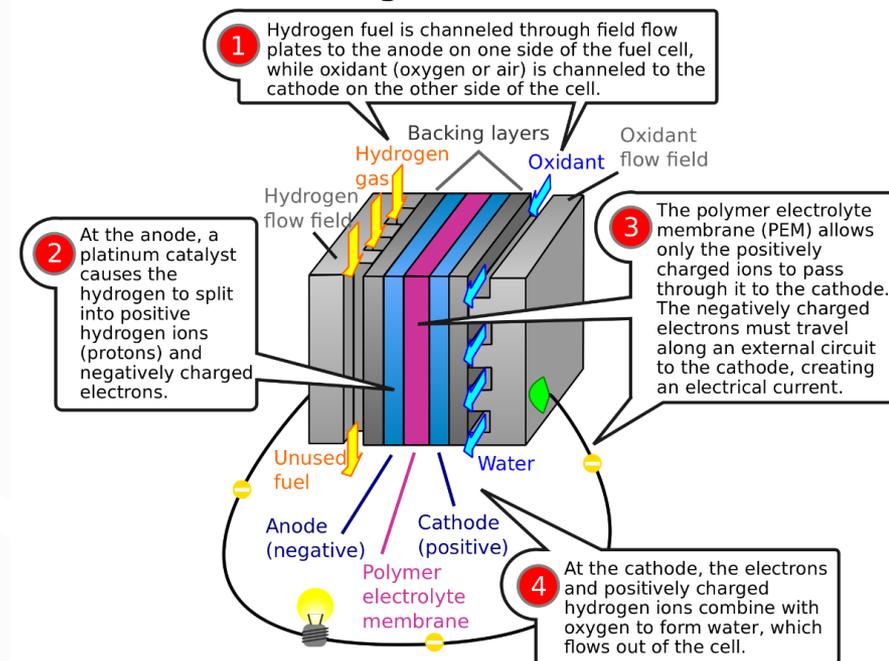


# Implats Fuel Cell Roadmap

IPHE Industry Forum  
December 2018

- ✓ Implats Fuel Cell Roadmap
- ✓ Successes
- ✓ Challenges
- ✓ South African Fuel Cell Industrial Hub
- ✓ Questions

## Proton exchange membrane fuel cell

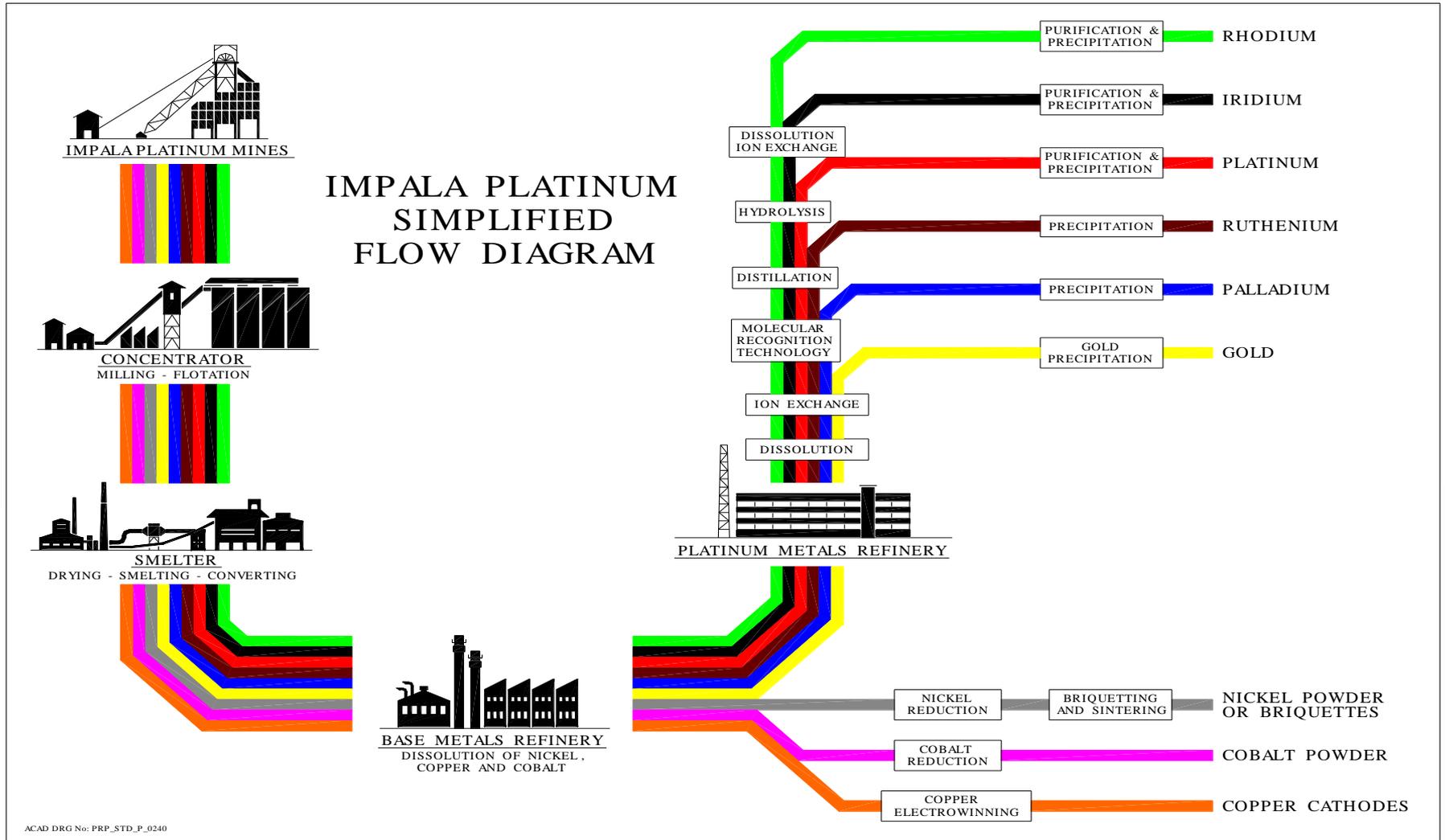


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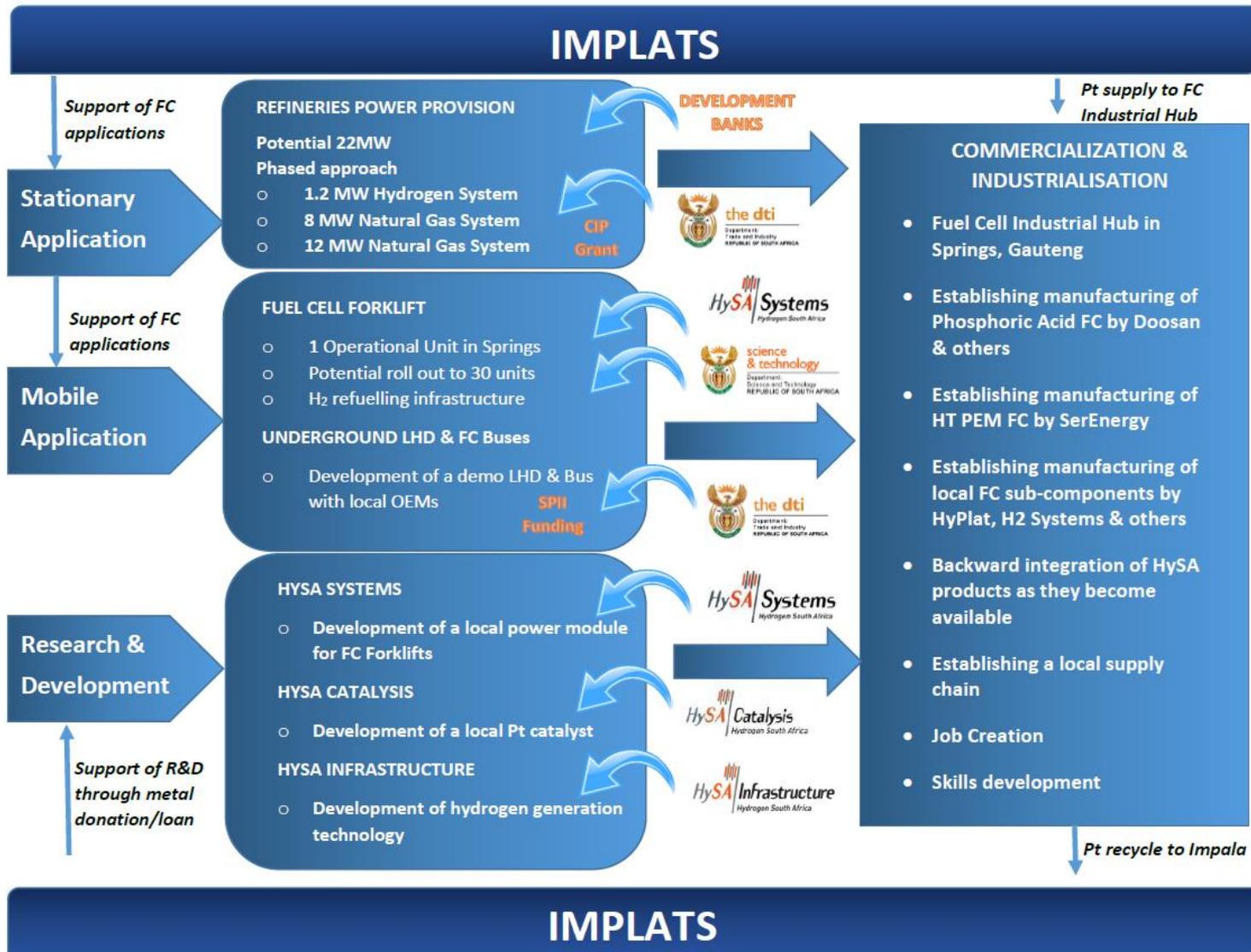
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ACAD DRG No: PRP\_STD\_P\_0240

- Leveraging current supporting infrastructure for both fuel cell manufacturing and deployment adjacent to Refineries
  - Piped hydrogen and natural gas
  - Piped nitrogen
  - Water, steam and cooling water
  - Available real estate







## Fuel Cell Successes

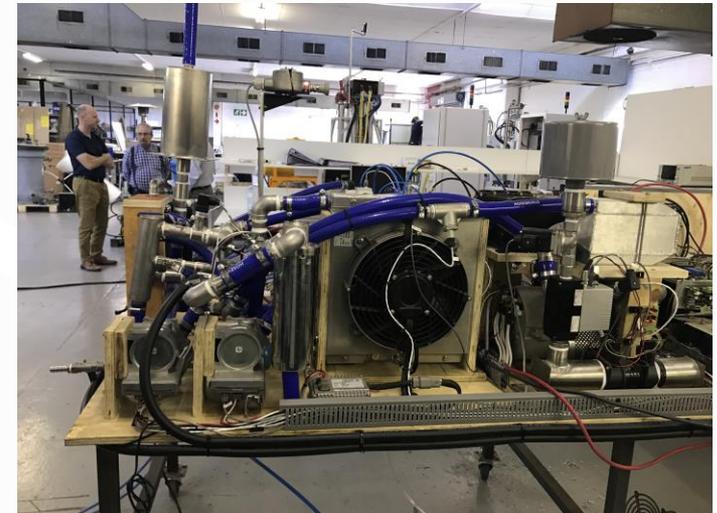
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- Online October 2015, Launched March 2016
- Operational for 3 years
- Two services on forklift, fuel cell and refuelling station
- Prototype proof of concept
- Need to industrialise the unit for commercialisation



# Fuel cell forklift – Development of a local power module

- Local design – HySA Systems and Hot Platinum
- Use of commercial stack
- Desktop assembly complete
- Test unit complete
- Lead encased hydride cassettes are being produced – IP sensitive
- Next steps: integration into a 3 tonne forklift



## ■ Load haul dumpers

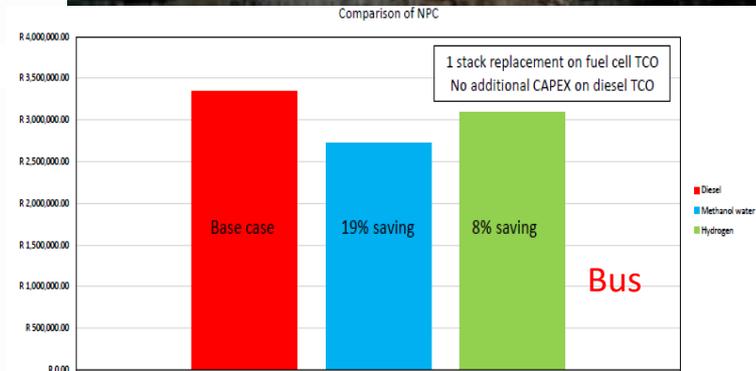
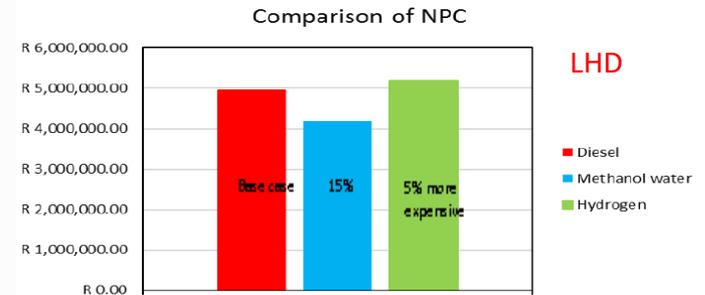
- Mainly diesel
- DPMs
- Ventilation and cooling
- High cost of CAPEX and OPEX
- No gas infrastructure
- Confined space - work area
- Technical and fuel overview
- Local LHD

## ■ Buses

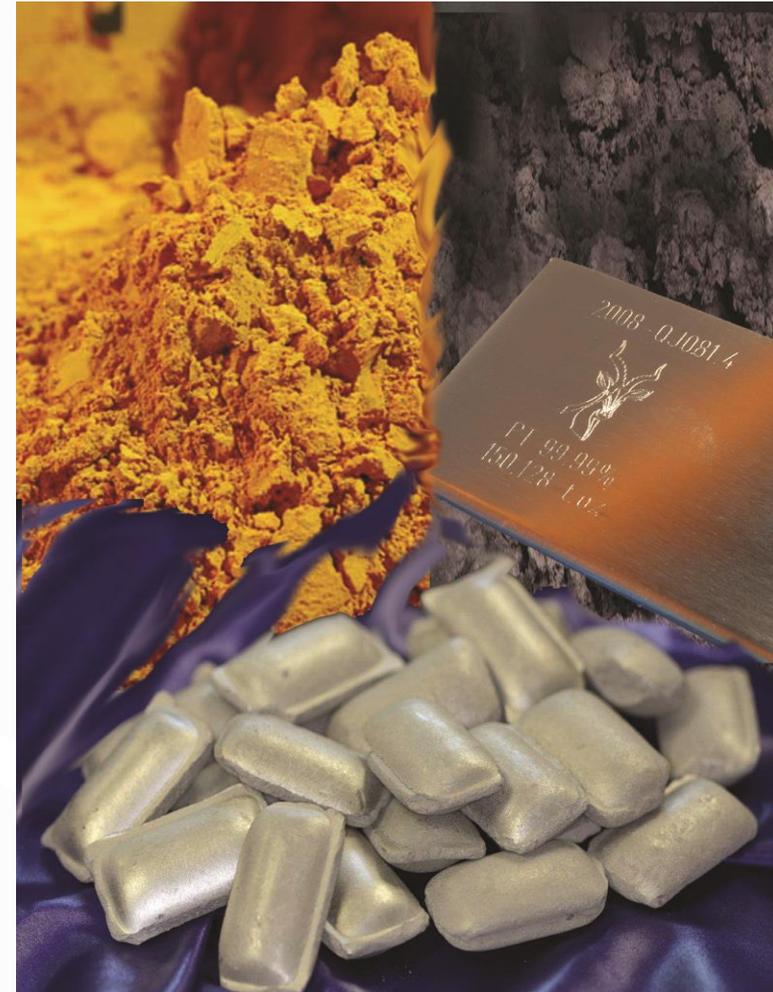
- Mainly diesel
- Move towards a reduced carbon footprint
- Local chassis and bus top structure

## ■ Compressed hydrogen underground

- Safety
- Cost
- Change management



- Catalyst development
  - Pt/C
  - Up to 3 kg catalyst batches prepared and tested
  - Parity with commercial catalyst achieved
- Metal loan agreement
  - Pt
  - Ir
- Metal Leasing structure
  - Pt
  - Ir
- 3kW stationary demonstration
  - Using HyPlat MEA in a commercial stack
  - Second commercial unit run alongside for validation
  - Testing platform and hydrogen





# Fuel Cell Challenges

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- Cost of Capital
  - Fuel Cells are where Solar was at its onset
  - Limited grant funding opportunity
  - Rigid funding models and structures
  - 'Bleeding Mining' sector
- Infrastructure
  - Gas production
  - Gas availability
  - Gas supply
  - Cost of Gas
- Lack of synergy and alignment between parties
  - Government
  - Private sector
  - Academia
- Policy framework
  - IRP
  - EIA requirements
  - License and registration of mobile vehicles
  - Standards, etc





**South African PGM Industrial  
Hub  
Focused on Fuel Cell  
Manufacturing**

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# A Fuel Cell Special Economic Zone (SEZ)?

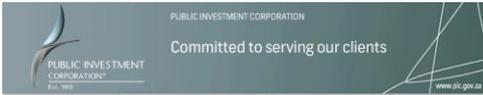
- Provision of serviced land for the SEZ
  - ❖ 16 Ha Land
  - ❖ GIDZ & Ekurhuleni Metropolitan Municipality
- Guarantee of platinum metal supply
- Closed looping of platinum
- Promotion of industrialization
- Potential to enhance overall competitiveness
- Potential to significantly grow knowledge - based jobs
  - ❖ current industry 6000 direct jobs, 3-5 times multiplier effect
- Provision of new opportunities for other key industry sectors
- A platform to grow high value exports
- Opportunity for South Africa to:
  - ❖ reducing global greenhouse emissions
  - ❖ diminishing urban pollutants
  - ❖ improved quality of life



- Close working relationship with GIDZ
- High level feasibility studies complete
- Geotech study complete
- Section 54 application complete
- Radiation Specialist Survey complete
- Engagement with potential occupants ongoing
  - Enterprise development
  - Supply chain development
- Opportunities for collaboration and demonstration



***SEZ approved for designation***



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