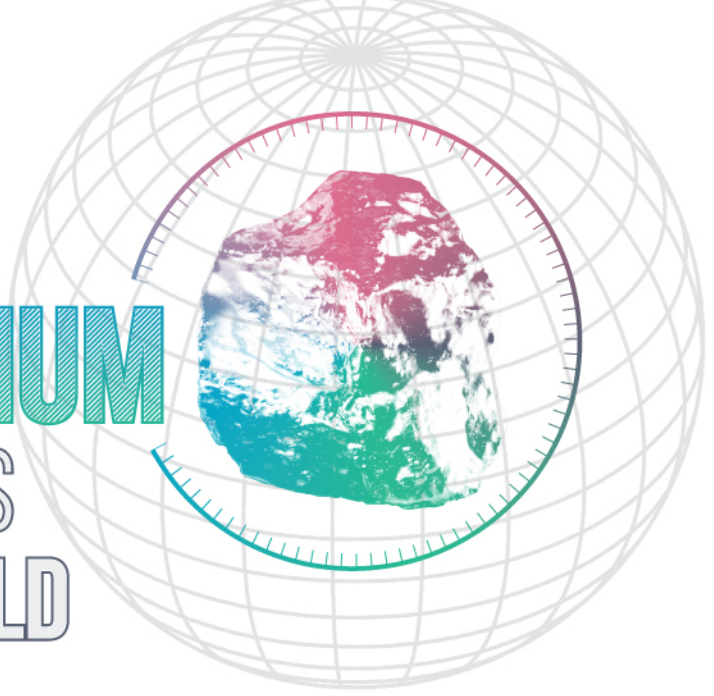
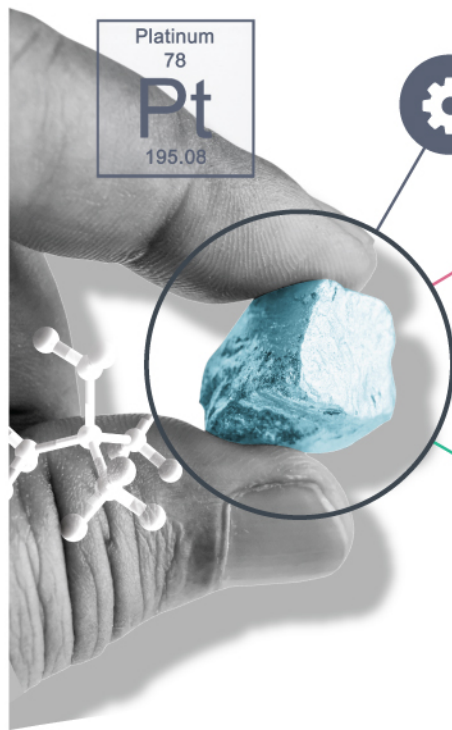
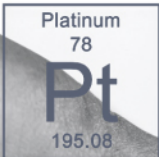


# HOW PLATINUM IMPROVES OUR WORLD



Platinum is a critical metal for the health and wealth of the world.

## PLATINUM'S INDUSTRIAL APPLICATIONS



**MANUFACTURING** - from fertiliser, fibre glass and lightbulbs to airbags and sticky notes



**HEALTHCARE** - medical devices and cancer treatments



**ENVIRONMENTAL** - harnessing renewable energy and reducing vehicle emissions



**RENEWABLE POWER** - fuel cell electric vehicles

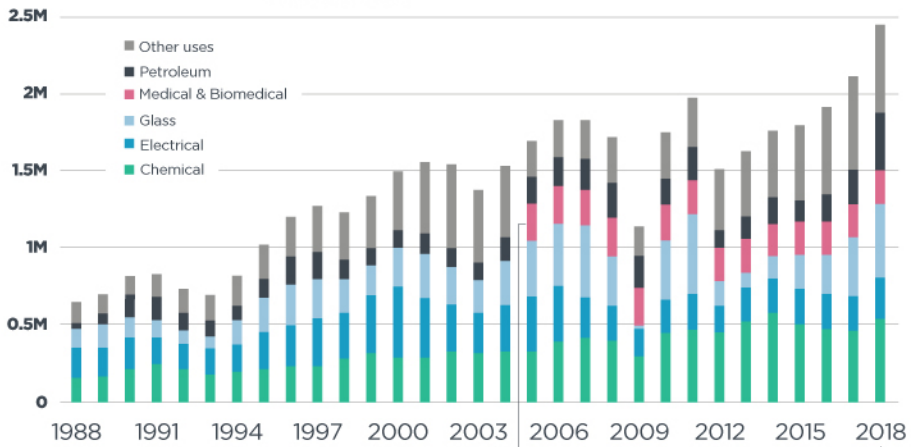


## MANUFACTURING

Platinum's versatility keeps it in demand. **Industrial use of platinum has increased nearly 4x since 1980.**

### PLATINUM DEMAND: INDUSTRIAL (OZ<sup>1</sup>)

<sup>1</sup>excludes automotive uses



**i** Industrial demand for platinum has grown at an average of 4.6% per annum from 1988 to 2018

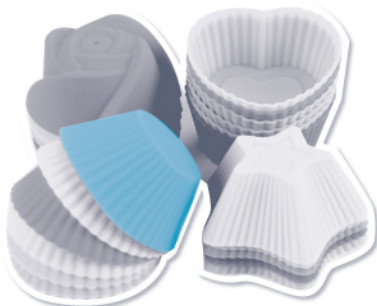
**i** Medical and biomedical demand was included in 'other uses' prior to 2005

**i** Industrial demand for platinum in 2018 was 3.8 times that in 1988

Source: Johnson Matthey  
PGM Market Report May 2019

## FERTILIZER PRODUCTION

Platinum's catalytic properties efficiently converts ammonia to nitric acid. This paved the way for the large-scale production of fertiliser which still today uses a platinum-rhodium gauze catalyst. Around 90% of nitrogen manufactured with using platinum goes towards producing the 190m tonnes of fertiliser nutrients used each year.



## PLATINUM-CURED SILICONE BAKEWARE

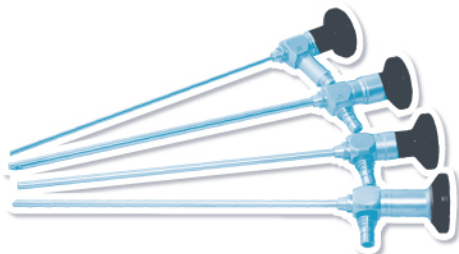
Platinum is frequently used as a catalyst in the curing process of silicone rubber, especially in the manufacturing of speciality silicones, where performance characteristics such as high purity, tear-resistance, transparency and low toxicity are important.



## HEALTHCARE

Platinum is a biologically compatible metal because it is non-toxic and stable. It does not react with, or negatively affect, body tissue.

### 1 SURGICAL INSTRUMENTATION



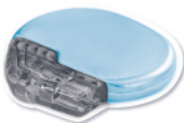
#### ARTHROSCOPIC TOOLS

Platinum's use in surgical tools dates back to 1874. Platinum continues to be a critical material in medical surgery tools, importantly today as it is easily visible under X-ray during keyhole surgery.



#### HEARING ASSIST DEVICES

Platinum wiring and coils assist in "brain pacemakers", used to treat some movement disorders, and in cochlear implants as well.



#### CARDIAC RHYTHM MANAGEMENT

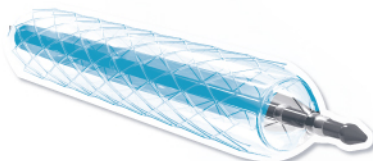
[DEFIBRILLATOR IMPLANTS/PACEMAKERS]

Over 700,000 pacemakers are fitted worldwide each year: components and leads are predominantly platinum.

Source: [specialtymetals.com](http://specialtymetals.com)

### 2 ELECTRO-MECHANICAL IMPLANTS

### 3 INTERVENTIONAL



#### STENTS

Platinum alloys have been employed extensively in treatments for coronary artery disease such as balloon angioplasty and stenting, where visibility under X-ray is critical. This visibility has greatly improved patient outcomes.



#### KNEE IMPLANT

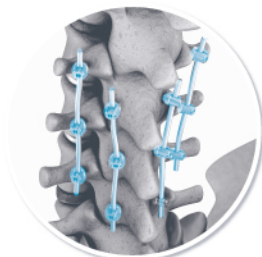


#### HIP IMPLANT

Platinum and platinum compound coatings are essential to reduce the chance of a body's rejection of an implant.

Source: A Healthy Future: Platinum in Medical Applications

#### SPINAL FIXATION

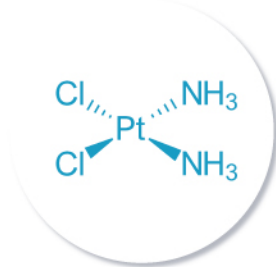


### 4 ORTHOPAEDICS

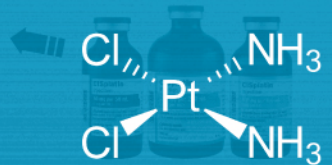
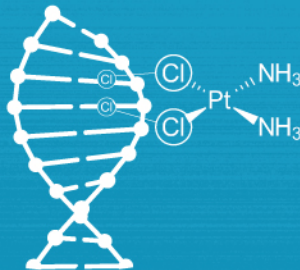
# THE “PLATINUM STANDARD” OF CANCER TREATMENT



Platinum compounds such as **cisplatin** damage cancer cells and can treat specific cancers, including **testicular, ovarian, lung, bladder, and head and neck cancers.**



**Cisplatin compounds** produce changes in DNA structure, which causes cancer cell death (apoptosis).



Source: DNA repair pathways and cisplatin resistance: an intimate relationship  
[healthengine.com.au](http://healthengine.com.au)





## ENVIRONMENTAL

Platinum's properties make it critical to reducing air pollution and in the construction of energy-efficient fibreglass.

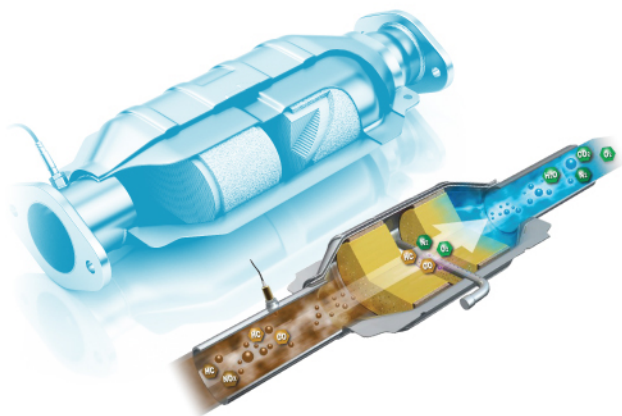
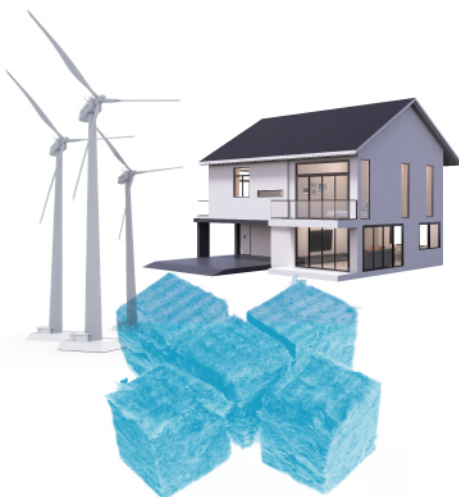
### FIBREGLASS

Increasingly, glass is helping to provide sustainable solutions in the automotive, construction and renewable energy sectors that are reducing the impact of climate change.

For example, usage of glass fibre-based materials is rising in the automotive industry. This strong, but lightweight, material is being adopted to reduce vehicle weight, helping automakers to meet fuel economy targets and tightening emissions standards across the world.

Fibreglass is also used in construction as an insulating material to reduce heat loss. The renewable energy sector relies on high-quality glass components for photo voltaic (solar) panels and high-quality fibreglass to make wind turbines.

Source: WPIC



### CATALYTIC CONVERTERS

A catalytic converter is an exhaust emission control device that converts toxic gases and pollutants from internal combustion engines into less-toxic pollutants by interaction with the surface of platinum.

# RENEWABLE POWER

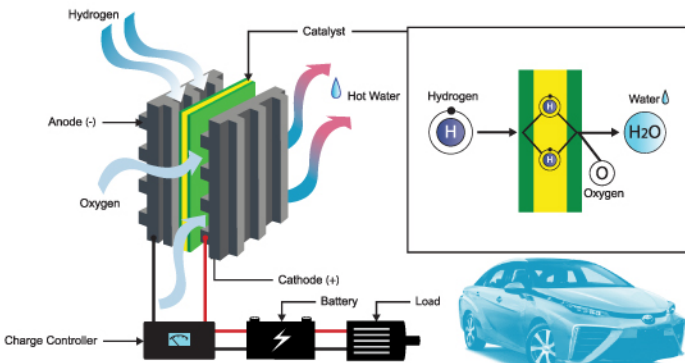
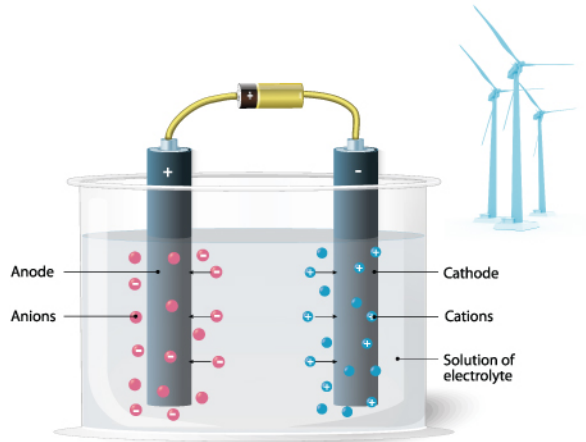
Platinum's catalytic properties make it critical to cleaning up air pollution, producing renewable hydrogen and unleashing the power of hydrogen in fuel cells.



## HYDROGEN ELECTROLYSIS

Electrolysis of water is the decomposition of water into oxygen and hydrogen gas by the passage of an electric current.

Platinum's conductivity makes it an ideal material in the production of hydrogen.



Toyota Mirai

## FUEL CELLS

Platinum's properties make it an ideal surface for the Proton Exchange Membrane "PEM" in fuel cells, used in the growing number of fuel cell electric vehicles.

Platinum's unique properties are crucial to many industrial processes that improve our lives.



PRESENTED BY:



Our mission is to stimulate investor demand for physical platinum through both actionable insights and targeted development: providing investors with the information to support informed decisions regarding platinum; working with financial institutions and market participants to develop products and channels that investors need.