

# A century of infrastructure service delivery

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**How to cite this article:**  
Wall K. A century of infrastructure service delivery. *S Afr J Sci.* 2011;107(11/12), Art. #968, 3 pages. <http://dx.doi.org/10.4102/sajs.v107i11/12.968>

In May 1910 South Africa was established by an Act of Union. The century thereafter saw huge changes take place in our nation – in politics, in social norms, and in every other sphere of life. It also saw huge change in infrastructure engineering and science – and in the delivery of that infrastructure.

As we make ourselves ‘comfortable’ utilising a *flush toilet*, before we pocket our *cellphones*, climb into our *cars*, switch on the *radio* or a *CD*, and head through sets of *traffic lights*, on a *tarred* road via a multi-level *interchange* giving access to the *freeway* to the *airport*, to catch an *aircraft* flight that we had booked on the *Internet* and paid for electronically with a *credit card*, do we reflect on the technology and the engineering infrastructure that we so much take for granted – but which was not available to our forebears in 1910?

My father grew up in a home with a bucket toilet in the *uithuisie* at the end of the garden – I remember him telling me about the ‘night soil’ cart. My mother’s home had a ‘long drop’. Both of these were in urban areas, by the way. Neither family had a bathroom inside the house – my father’s family bathed in a tub in the kitchen. I myself spent my earliest years in a house in Green Point, Cape Town, which had a sanitary lane at the back. Whereas the house by then had a flush toilet, when it was built in the 1930s it was served by a bucket toilet system, hence the sanitary lane. Neither of my parents had a telephone in their homes until they were thirty-something.

The infrastructure investment in South Africa over the century since Union is staggering. This investment has arisen partly because of population increase (from 6 million in 1910 to an estimated 50 million in 2011); partly because of rural-to-urban migration; partly because of smaller family sizes (and hence more dwellings, water connections and so on); and partly because of concern for social equity, coupled with demand for each household to have its own facilities.

This increase in infrastructure has led to an increased consumption per capita of engineering infrastructure services such as water (e.g. taps inside homes, whereas previously a shared standpipe in the street or, for the rural poor, a distant well or natural source such as a spring). Increased consumption has also been driven by higher levels of hygiene (more washing), flush sanitation and more water-using devices in the home, as well as higher industrial and commercial usage of water.

To illustrate, in 1910, the Cape Town water undertaking served 155 000 people an average of 129 L per capita per day, whereas in 2010 a population grown to over 3.5 million received an average of 255 L per capita per day. That is almost a doubling of consumption per capita. We no longer see the ‘Amawasha’ in the spruets of Johannesburg, nor the municipal washhouses (e.g. the one that used to be in District 6), nor the steam laundries (e.g. that in an Auckland Park heritage building sadly recently illegally demolished).

In 1910, municipal government was severely challenged to provide services to keep pace with population growth, and *that* has not changed. The demands have indeed increased. As the years have gone by, municipalities have had to offer a wider and wider range of services, and more and more sophisticated services – and not, as in the earliest years, provide them almost exclusively to those able to pay for them.

Slow-moving horse-drawn traffic compacted the small stones that were part of most road surfaces in 1910. Motor cars, with their faster speeds and rubber tyres, kicked these stones out of place, gradually eroding the road surface. For this and other reasons, programmes to tar major roads were by 1910 only just beginning, starting with streets in the city centre.

Cities were much more densely settled in 1910 than they are now, thereby facilitating public transport. Car ownership was negligible. Commuters walked to work and school, or caught a

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Source: Western Cape Archives and Records Service

Laying of tramlines, Tamboerskloof c 1905 (photo: Arthur Elliott). Archives number E7837.

bus, or (if there was a service) the tram or train. Even the high-ranking in the land took the train – thus, when in 1926 an evening commuter train derailed at Salt River Station and crashed into the pillars of the road-over-rail bridge, amongst the dead was the Judge-President of the Cape, Sir Malcolm Searle.

Increasing private car ownership, together with household aspirations for more dwelling space, have led to decreasing urban densities. Invariably, at the same time as density falls, population increases, hence urban sprawl. For example, in 1904 Capetonians lived at a density of 115 people per hectare (within 23 square kilometres), but by 2000 the density had decreased to 39 per hectare (within 774 square kilometres). Even if the population had not increased, the area of the metropole would have increased threefold to accommodate the decreasing density. Establishment in the apartheid era of segregated low-income housing areas, invariably at some distance from then existing urban areas, exacerbated the trend.

In more recent decades we have seen the rise of the combi-taxi industry in order to meet the needs of commuters for a convenient and affordable (if at times hazardous) service. This service, too, has origins in the segregated townships – who remembers travelling in the overloaded Valiants of the 1960s? The taxis have largely been responsible for the steadily declining proportion of commuters that use either bus or commuter rail in those cities with such services. Growth in commuter traffic has to all intents and purposes been entirely absorbed by taxis – commuter rail patronage has increased only marginally over the last dozen years.<sup>12</sup> In part, at least, the insignificance of the rail patronage increase can be ascribed to ageing infrastructure and fears of personal security making the ride unattractive.

Thanks to the relative fall in the cost of road transport and the simultaneous decline in the quality of the rail service, rail has

also long lost its dominant position as the preferred mode of freight transport. In 2008:

Road transported 1.4 billion tons of freight at an average transport distance of 185 km .... [whilst] rail transported 204 million tons at an average transport distance of 640 km. The trend of flattening rail traffic volumes and the absorption of growth in traffic volumes on road continue (p. 21).<sup>3</sup>

Heavy vehicles are damaging our road infrastructure. Various efforts over the past few years have not had the desired effect of getting some appropriate freight back onto rail (p. 11).<sup>3</sup>

Thanks to containerisation, a ship of the same size can, for the same length of time in port, unload anything between 20 and 100 times more cargo.

The year 1910, coincidentally, saw the first importation of the Model T Ford, earliest evidence that mass production might mean cheaper cars, and therefore that motoring would no longer be the privilege of the sporty rich. By 1925 there were 18 000 Fords on South African roads – almost three times more than any other make.

Intercity passenger travel, in 1910 almost exclusively by rail, has long been overtaken by the relative cost and convenience advantages of road and air travel. Prior to the 1930s, intercity motor travel was undertaken only by the daring – and the patient! A traveller between Bloemfontein and Winburg in the 1920s complained that, over a distance of 100 miles, 73 farm gates had to be negotiated. In that same decade it became the ambition of ‘motor aces’ to beat the Union Express train on its 30-hour journey between Cape Town and Johannesburg. After several failed attempts, this victory was achieved only in 1925. Although the national road programme to link major centres with all-weather roads had commenced prior to World War II, it was not completed until the 1960s. I remember years ago reading a National Roads Board report of the immediate post-war era in which the chairman boasted of the great progress already made. For instance, he said, a third of the Johannesburg–Durban national road had been tarred. And farm gates across the national road to the Cape had nearly all been removed – only a few, mostly in the vicinity of Richmond, were left!

The information and communication technology (ICT) sector differs from infrastructure sectors such as transport, energy, and water and sanitation in that it is characterised by mostly private sector and parastatal service delivery providers, and also in that it is not constrained by physical boundaries, although it must comply with national policies. South African landmarks include the first overseas radio telegraph message received (from London in 1924), the first overseas telephone call (between Cape Town and London in 1932), and the first television service (1976). The World Wide Web was launched in 1989, and in South Africa the first mobile telephony cellular networks were introduced in 1994. Today many ICT components are rapidly converging into smaller and more user-friendly mobile devices that are transforming the way we work, transact and play.

Electricity generation and supply was in 1910 mostly in private hands. Eskom, established in 1923, gradually bought



A communal water point in Joe Slovo informal settlement, Cape Town (photo: Kevin Wall).

out most of the private generators of electricity. Nonetheless, several municipalities (especially the coastal municipalities) continued to generate electricity for decades thereafter. In 1969, construction of the first national transmission grid was commenced, in order to link the power stations on the coalfields with the more distant urban centres and mines – and in order to relieve these centres of their dependence on the coal trucks of the South African Railways and Harbours Administration, then an arm of national government.

Distribution of this electricity has for decades been shared between municipalities and Eskom. It is interesting, given present campaigns to reduce electricity consumption, to recall that in the 1930s (and right up until the 1950s) many municipalities encouraged *increased* consumption, attempting to wean householders from coal and town gas, for example by opening showrooms in order to retail appliances. (My mother bought a stove from the Cape Town municipality's Electricity House showroom in Strand Street; the Cape Sun Hotel now stands on the site.) More recently, since the late 1970s, rising concern for social equity has led to the electrification of many homes in specific townships. And since 2000, in terms of the free basic services policy, the first 50 KW hours of consumption each month is supplied at no cost to qualifying households.

In 1910 the largest dams in South Africa were those on Table Mountain. Since then a large number of massive dams, together with extensive major pipeline systems, irrigation schemes and other major water infrastructure have been built. Radical changes have over the years been made to water legislation. Of particular importance were the changes since 1994 in what constitutes a 'right' to water, the prioritisation of these rights, and who is entitled – provision of water was high on the agenda of the new government's Reconstruction and Development Programme, and the 1996 constitution of South Africa singled out access to water and sanitation as rights. Thus the focus over the last couple of decades has been more inclusive of awareness that water is a finite resource needing to be managed in a sustainable manner; concern for the environment; and legislatively entrenching access to water as a basic human right in a society where the majority of the population had been discriminated against. In respect of water for agricultural purposes, for example, the dominant riparian right to water was abolished, and at

the same time measures were instituted to redress historic dispossession of land and hence of water.

Also, in 2000 a policy was instituted of free basic water and sanitation (and, as noted above, electricity) for the indigent. This policy has been a huge boon to many, especially in the urban areas, although how to extend the benefit to those who are not within reach of a reticulated supply has still to be resolved.

The legislated health and environmental standards for water treatment works and wastewater treatment works have over the years become steadily more rigorous. For example, the effluent commonly discharged to natural watercourses in 1910 would be illegal today. The *Union Health Act of 1919* prohibited the discharge of treated effluent from a sewage purification works to a natural watercourse, and stipulated that it had to be discharged onto land – this practice introduced the era of the so-called 'sewage farms'. This policy was changed by the *Water Act of 1954*, which prohibited disposal to land, replacing it with a requirement for treated effluent of acceptable quality to be discharged to natural water bodies.

Sadly, whilst rolling out extensive infrastructure, we have as a rule made far too little provision for its maintenance. But it ought to be obvious that unreliability of infrastructure piecemeal erodes the gains made since 1910. Interruptions to services delivered by engineering infrastructure undermine the economy (no electricity supply to commercial and industrial areas equates to no lighting, no elevators, no machines, no mine production) and quality of life (no electricity in residential areas means no light to study by, no hot water, no microwave or refrigerator, no charging of cellphones). And when a service breaks down it is usually the poor, who have no coping mechanism, who are hardest hit.

Engineering infrastructure has indeed revolutionised the way we live, work, study, play, dispose of wastes, travel and communicate. Aircraft and the motor car, with improved roads, have revolutionised intercity travel; the Internet (and Wiki) have revolutionised how learners prepare assignments; computers (and software) have revolutionised data sorting and analysis; aerial photography and satellite imagery have revolutionised map-making – the list could go on.

We live a different life to that of our forebears of 1910. Do we appreciate how much we owe to infrastructure engineering and the science that underlies that engineering – and do we value the infrastructure service that has been delivered?

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