

for 95.5 per cent of the total units generated. The effect of the progressive improvements in steam power station practice which have taken place in the stations of authorised undertakers during the past four years alone is shown by the fact that the average number of electric units generated per ton of coal and coke consumed has risen from 1,200 in 1930 to 1,425 in 1934, an increase of more than 18 per cent. The Commissioners deprecate the custom of some public supply authorities, when advertising for tenders, of specifying that the particular plant or materials should be the product of a particular firm or group of manufacturers.

#### Thermal-Electric Stations

A STRONG case is made, in a paper read before the Institution of Civil Engineers on December 10 by Mr. S. B. Donkin, for the adoption, where possible, of the thermal-electric power station. The ordinary electric power station, using coal as a source of energy, has an overall thermal efficiency of about thirty per cent, whereas in a thermal-electric station which, besides supplying electric energy, also distributes the latent heat of the steam for domestic, horticultural and industrial heating, an overall efficiency of 60–70 per cent can be obtained. Where this system could be successfully adopted, it would solve the difficulty which is likely to arise if coal prices advance. That it is practicable is shown by the stations established in the United States, in the U.S.S.R. and elsewhere. Industrial plants operating on this system have been installed in England, but these are necessarily limited in effect to the requirements of the individual factory.

THE success of a public station would depend upon maintaining a balance between the electricity demand and the heat demand, for the waste heat available rises and falls with the rate of electricity generation; as a general rule, the heat requirements would be greatest in the early part of the day, while the electricity peak occurs in the late afternoon; seasonal variations are much more marked. A solution might be found in the inter-connexion of the electric side with that of the authorised electrical undertaking in the district. It is admitted that such stations could not easily be established in our older manufacturing towns owing to the cost of installing the heat-distribution network in congested streets already provided with electricity, gas, water, sewerage and drainage services. Mr. Donkin claims, however, that in laying out new industrial areas it would be possible to arrange for the supply of heat and electricity from a combined thermal-electric station, high-grade heat being supplied for manufacturing purposes, medium for domestic uses and low-grade for horticultural needs. To attain the high thermal efficiency quoted, it is necessary to use boilers operating at pressures of 2,000 lb. per square inch or more. The paper includes the diagrammatic lay-out of an ideal industrial town planned on these lines, and reference is made to existing stations.

#### New Australia-Tasmania Submarine Cable

THE new submarine cable which was successfully laid across the Bass Strait last November marks a notable advance in the technique of submarine cable transmission. Before laying this cable, the Australian Government made a searching inquiry into the relative merits of radio and cable systems of communication, and came to the conclusion that for the objects in view the cable system was the more desirable as it is more trustworthy and easier to make the messages secret. In the Engineering Supplement to the *Siemens Magazine* of January, a technical description is given of this new cable. It links the telephone and telegraph service of the mainland of Australia with Tasmania. Its length of 161 nautical miles is divided into two sections. The northern section, 79 miles in length, joins King Island to Apollo Bay, Victoria, and then by overhead lines and underground cables joins the trunk exchange at Melbourne. The southern section from King Island goes to the northern coast of Tasmania and then by land line to the Launceston exchange. Inter-connexion is thus effected with the existing network of communications in Australia and Tasmania. This cable, although it has only one insulated conductor, allows no less than five telephone and seven high-speed telegraph channels to be operated simultaneously. In addition, it provides for the transmission of a broadcast programme. Subscribers in Tasmania can now communicate directly with Great Britain by telephone. The adoption of a high-frequency carrier system was influenced by the fact that it is easy to repair. Cable ships are not always available for immediate service in Australian waters and this type of cable is the easiest to repair. There are already two carrier frequency submarine cables in operation. One connects Teneriffe with Gran Canaria, a distance of forty miles, and the other Key-West to Havana, a distance of 109 miles. Both these cables operate only three telephone circuits.

#### Bats in Belfries and Elsewhere

THE problem of eliminating bats from church-steeple has puzzled many a churchwarden, and was responsible for the introduction to England of that unwelcome guest, the little owl. Solutions to that, and to the general problem of the roosting of bats in homes and occupied buildings, are offered by the United States Bureau of Biological Survey, in Leaflet 109 (Sept. 1935). The objection to the presence of bats is partly due to an aversion which many people feel towards them, but more substantially to the highly objectionable stench of the droppings and urine which collect where bats are roosting in numbers. There are two main lines of procedure in breaking up a bat-roost. The most satisfactory and the only permanent way is to make the building bat-proof by closing all entrances by strips of metal or wood or plugging them with rags (of course after the bats have left their roost in the evening). A good composition for larger openings is tarred hemp fibre such as is used for calking ships. The second method is sometimes simpler—the use of a repellent such as



naphthalene flakes, liberally distributed in and about the spaces occupied by the bats. A third method is the destruction of the bats by fumigation with, say, hydrocyanic acid generated from calcium cyanide; but the procedure is dangerous and demands handling by an expert, and it has the disadvantage of leaving the dead bodies of the bats to decompose and add to the odours of the roost.

#### The Albert National Park in the Belgian Congo

ON November 12, 1935, a decree was passed which doubled the area of what was already one of the most remarkable natural reserves in the world, the Parc National Albert du Congo Belge. The extension, carrying the park northward and westward to Lake Edward which it incorporates, increases the area of the reserve from 390,000 hectares to 856,790 hectares, and its average length and width to 270 km. and 40 km. respectively. Within this area, the greatest diversity of habitat is to be found, for it stretches from the equator to the extreme east of the Belgian colony, and rises from 850 metres in the Semliki Plain to 5,119 metres at Peak Marguerite. As a consequence, the region now included presents a succession of stages of vegetation from primitive tropical forest to the equatorial alpine zone, and in plants and animals contains a rich flora and fauna comprising many forms not elsewhere to be found. The value of the new extension is the greater since the Belgian reserve is contiguous with the British Uganda reserve, and ought to permit the adoption, through an extensive area in which the needs of the fauna and flora are similar, of common protective measures, such as were contemplated in the London Convention of November 1933 (Article 6) relative to the conservation of the natural fauna and flora, to which Belgium signified her adhesion.

#### Soil and Forest Conservation in the United States

THE United States has now awakened to the serious position brought about by the excessive felling and destruction of forests during the last fifty years. A great campaign is taking place with the object of impressing upon the people the valuable results to be expected from soil conservation and forest conservation, which are now regarded as national problems. The work of Mr. C. A. Connaughton of the U.S. Forest Service is commented upon in a recent communication from Science Service, Washington, D.C. This investigator has studied more than 3,000 test plots in burnt-over forest land, comprising both cut-over areas and virgin timber. In general, the more severe the fire the more severe also was the subsequent erosion. On the steeper lands, lightly burnt areas, on which the fire took only the top layer of the forest floor litter (the ordinary leaf fire, so termed), little erosion was perceivable, about 10 per cent of such plots being eroded. In the case of severe fires, so high as 80 per cent of the plots showed erosion. Mr. Connaughton's research would appear to merit attention from officers connected with these matters in the British Empire. "Of course," says the author, "where soil is eroded

away from a burnt-over forest site, it is difficult to make trees grow there again—impossible, if the erosion is severe enough to lay bare the underlying rock. But the damage is apt to be felt by people who never see or think about the forests. Hundreds of miles away, the freshets that gush through the erosion gullies accumulate as floods, in the greater rivers, piling out of their banks to wreak destruction, and leaving behind them, on lowland farms and industrial areas, burdens of silt that should be up in the hills, growing trees." This might have been written in connexion with the outer Punjab hills. The paper is given in full in the current issue of the *Journal of Forestry*.

#### Efficiency of Wood as Fuel

IN an age of so much and such abstruse research, it is common to find that no exact answer can be given to some of the most everyday problems. The Canadian Department of Mines found this to apply to the relative value of wood as domestic fuel as compared with coals. In Canada, this question has an importance which has long since disappeared in Great Britain. The Fuel Division of the Department has published tests by E. S. Malloch and C. E. Baltzer (Report No. 761, Ottawa, 10 cents) on the efficiency of wood as fuel for heating water in a furnace of the type normal in North America, and previously used for tests on coal and coke. Tests with an American anthracite showed a thermal efficiency of 66 per cent. Under comparable conditions, the efficiency of hardwood (maple) varied from 50 per cent (green) to 57 per cent (seasoned wood). Corresponding figures for soft wood (pine) were 42 per cent and 49 per cent. By placing a perforated plate over the firebars, the efficiency could be slightly increased, and in all cases the loss in unburnt fuel was negligible. These figures are quite good, but the wood compared unfavourably with coals in output and in the weight and volume of fuel to be handled.

#### San Francisco Bay Bridge

THE project of building a bridge across San Francisco Bay was first discussed seventy-five years ago. Photographs of the bridge now under construction given in the *Electrician* of February 14 show that it is nearing completion. The twin suspension bridges are the largest in the world and are attached to hollow concrete anchorages about 280 feet above the water. The centre towers are 519 feet high and the outer ones 474 feet. The main spans of the twin suspension bridges are 2,310 feet long and the side spans 1,610 feet. A tunnel through Yerba Buena Island connects the two halves of the bridge. The eastern half of the bridge has a cantilever span 1,400 feet long which is still uncompleted. The bridge is to cost £15,500,000, and is being built for the California Toll Bridge Authority. The bridge will be lighted by the largest installation of sodium vapour lamps in the world; they are arranged along the fifteen miles of roadways for the double deck spans, the tunnel and the approaches at the San Francisco and