

Bright future assured for solar power

WITH an average 320 days of sunshine every year in Iraq, it is hardly surprising that solar power figures prominently in the government's programme to develop alternative sources of energy. "So much sunlight is available here that if well used it could eventually reduce dependence on oil," says Nidhal al-Hamdani, director of the Solar Energy Research Centre (SERC). "Oil rationalisation is a national duty," she adds.

Over the next five years SERC will be concentrating on the application of solar energy to heating and cooling of homes and public buildings. Local production of solar-powered water heaters is expected within two years. Final designs are being studied by SERC prior to manufacture by a local mixed-sector enterprise believed to be Hilal Industrial Company. Talks have been held with Japan and European countries about supplying equipment to make the heaters. SERC has also signed a two-year contract with Hilal to develop mechanical and electrical machinery to be used in the manufacture of solar-powered airconditioning systems.

Two SERC buildings already rely on the sun to power their heating and cooling systems — the organisation's guest house

and its headquarters. On a larger scale, new apartments in Baghdad's Abu Nuwas housing project are to be fitted with solar-powered airconditioning.

Some 115 individual units, each comprising collector, storage tanks, boiler, cooling tower and control equipment, have been supplied by Japan's Yazaki Corporation, which also installed the solar-powered airconditioning in SERC's guest house.

Elsewhere there are plans — drawn up by consultant Heinle, Wischer & Partner of West Germany — to tap the sun's power for 70 per cent of the heating required in a large number of residential buildings attached to the new Al-Rashid university. The university's indoor swimming pool will also be solar-heated.

Other SERC projects in hand include a study, in association with Jordan's Royal Scientific Society, of solar soil sterilisation in 42 greenhouses. A pilot project to provide power for 40 street lamps is under way jointly with the EEC, and SERC has also undertaken studies on the use of solar energy to operate cooling and heating systems and other equipment in a series of bus terminals to be set up across the country.

SERC was established in 1980 under the aegis of the Scientific Research Council (SRC), whose job it is to establish a scientific and technical base for agriculture, industry and engineering. SERC is one of eight research centres overseen by SRC — the others are in agriculture and water resources, space and astronomy, biology, scientific documents, electronics and computers, building, and oil.

Water survey underlines urgency of investment

THE findings of a state study into drinking water requirements to the end of the century and beyond suggest that massive investment will be needed over the next 20 years if water supply is to keep pace with rapidly rising domestic demand.

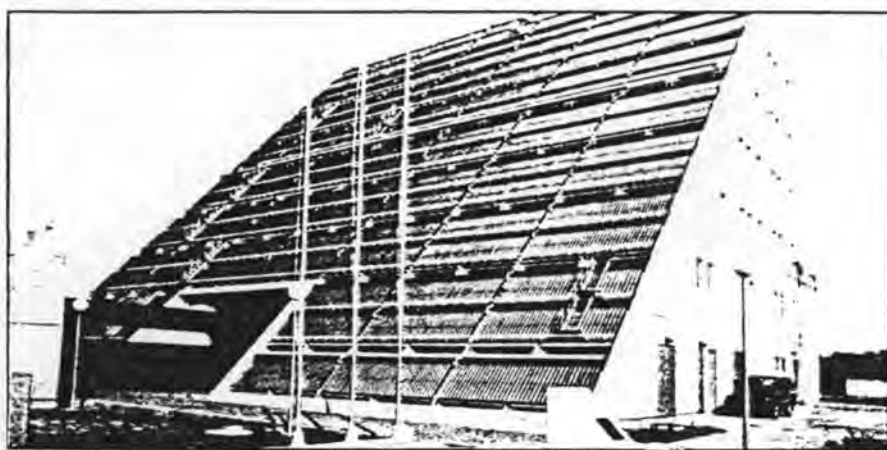
The study was conducted between 1979-83 by the State Organisation for Water & Sewerage (SOWS), whose responsibilities cover the entire country apart from Baghdad. SOWS estimated that the population — excluding the capital — would reach 7.5 million in 1984, rising to 15.8 million by 2005, at which time water consumption would be in the region of 6.7 million cubic metres a day. Total drinking water capacity in 1984 was between 3.2 million-3.8 million gallons a day.

SOWS recommended building a series of new treatment plants and distribution networks throughout the country. Locations named included Basra, Mosul, Hilla, Najaf/Kufa, Baiji, Rawa/Qaim, Hit/Qubaisa, Hindiya, Qaidir Karam, Sadiya and Yusifiya. Many of these were tendered in 1984, along with work at Khalis, Hai/Muwaqafiya, Rashidiya and Nahrawan.

More projects were announced at the beginning of 1985, several of which had been tendered in 1980-81 and subsequently shelved due to lack of money. They included water treatment plants and other work at Amadiya, Sarsank, Baaj/Sinjar, Shaqlawa/Salahaddin and Altun Kupri, and distribution networks for Arbil, Shirkat, Muqadadiya, Numaniya, Aziziya, Ramadi, Kerbala, Haditha/Haqlaniya, Oja, Samawa and Diwaniya. Some have now been tendered, together with facilities for Dohuk, Samidiyr/Muntasiriyn and Hamza.

Total expenditure by SOWS for 1984-88 is estimated in the organisation's study at ID 1,043 million (\$3,365 million). This comprises ID 912 million (\$2,942 million) for new treatment plants and urban distribution networks, ID 31 million (\$100 million) for improving existing systems, and ID 100 million (\$323 million) for new rural systems.

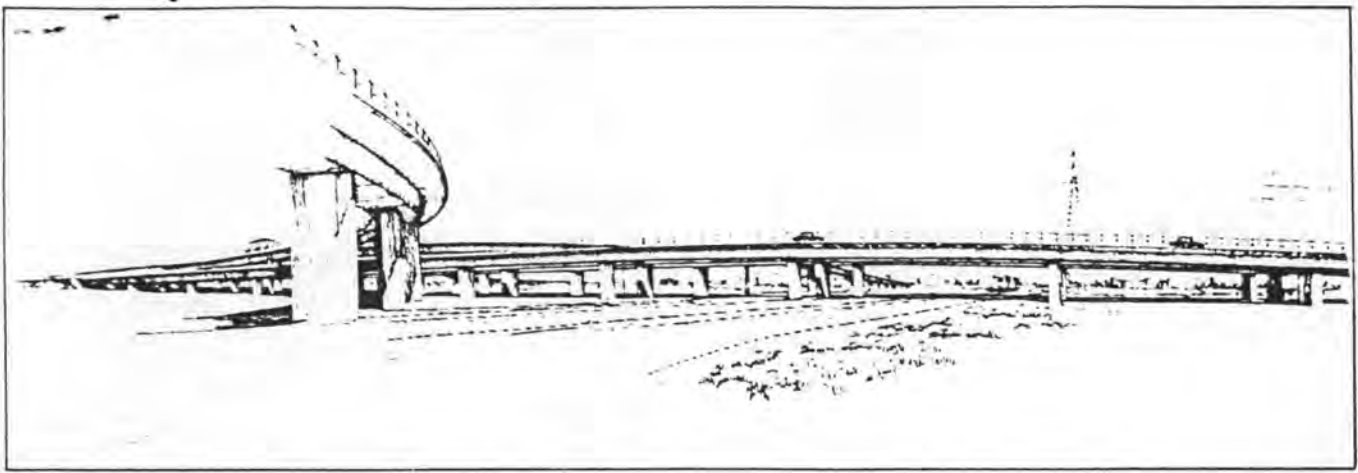
More than 18 projects have been tendered since mid-1984, together worth over ID 388 million (\$1,252 million), and some 13 contracts, worth a total ID 242 million (\$781 million), have been let. The latter include Kirkuk (\$110 million), awarded to South Korea's Hyundai Engineering & Construction Company, Mosul (\$80.6 million) and Hilla (\$51.6 million) to India's Som Datt Builders, Najaf/Kufa (\$61.3 million) to the local State Contracting Company for



SERC's headquarters is a striking building adjacent to Baghdad university in Jadiriya. Built by Japan's Shimizu Construction Company and Mitsubishi Corporation, it serves as one of the largest solar energy systems in the world, as well as providing a sophisticated working environment for SERC's staff.

The building's most prominent feature is its south wall, which is inclined at an angle of 45 degrees to derive maximum benefit from the 1,017 solar collectors installed over its 1,353-square-metre surface. Together with an additional 560 collectors sited in the grounds they meet the building's entire heating and hot water requirement and, through an absorption refrigerator, 70 per cent of its cooling needs.

The solar collectors, of the heat pipe evacuated glass tube type, were supplied by Japan's Sharp Corporation. Their efficiency is aided by 15 millimetres of thermal insulation fitted inside the walls.



THE Abu Ghraib expressway is one of the last major road schemes being built in Baghdad under the current five-year plan (1981-85). The contractor, South Korea's Samsung Construction Company, took over the \$200 million project in September 1984, after the original contractor — UK-Kuwaiti joint venture Kier-MSS — pulled out.

The 30-kilometre, six-lane motorway, which includes a three-level interchange (illustrated above) with nine viaduct structures, will eventually provide a link between the centre of the capital and the Baghdad West interchange on expressway number one. Designs and supervision are by Denmark's Cowiconsult; client is the State Organisation for Roads & Bridges (SORB).

Most of the basic road infrastructure in the capital, including essential bridges, expressways and intersections, has been completed. But according to the city's road masterplan, there are several large projects outstanding. Among them are four tunnels under the river Tigris, a number of bridges, the Muthanna

expressway, the second stage of the Abu Ghraib expressway, and the outer orbital road.

Outside the capital, Yugoslav, Japanese, West German, Austrian, South Korean, Polish and Brazilian companies are still working on expressway number one, which will eventually link Baghdad with Syria, Jordan and Kuwait. Designs and supervision are by West Germany's Dorsch Consult. Progress — under difficult conditions — has been slow, and SORB is seeking new contractors to replace French and Filipino companies which have pulled out.

Cowiconsult has now completed much of the initial design for expressway number two, which will link Baghdad with the Turkish border north of Dohuk via Samara, Kirkuk, Arbil and Mosul. However, given the estimated cost of the 525-kilometre project — about \$3,000 million — tenders look unlikely to be called in the near future. Also planned, but not yet designed, is expressway number three, an alternative route to Basra.

Water & Sewerage Projects (SCCWASP), and Khalis (\$22 million) to Spain's Dragados & Construcciones.

Local and Jordanian firms have won a further nine awards. However, some contractors have yet to identify their mechanical and electrical subcontractors, and may be having problems in persuading companies to work within their prices, or to come up with the necessary financing.

Some parts of water supply schemes at Baquba, Sulaimaniya and Kerbala began operating this year, and Diwaniya is expected to start up in 1986.

The largest project planned — at Basra — has still to be awarded. Another large scheme, at Nasiriya, will be bid in October, and may herald future tender calls for Kut and Amara. Much of the design work for the latter three schemes was done by Denmark's Cowiconsult. Ireland's Jennings O'Donovan, Canada's Associated Engineering Services and the Swiss Consultants consortium have prepared designs for projects including Kirkuk, Najaf/Kufa, Mosul and Hilla, but it is unclear how much of their work has been incorporated, as SOWS is understood to be using its own basic designs for most of the projects tendered.

Water projects are expected to get the lion's share of future Local Government Ministry allocations for water and sewerage, but the SOWS study also recommended substantial work to extend and improve sewerage. Tender announcements

in 1985 for the third stage of Basra's sewerage scheme, designed by West Germany's Beller Consult, and for the main trunk sewer and pumping station at Mosul, were the first indications that new sewerage outside Baghdad was about to be accorded some priority.

SCCWASP, in association with several international companies, is reported to have completed work on projects at Nasiriya, Amara, Diwaniya, Kerbala, Najaf, Sulaimaniya and Hilla. The company is currently working on schemes in Tikrit, Qadisiya, Dujail and Balad.

In 1981 consultants were asked to bid for contracts comprising second-phase sewerage designs for several groups of towns: Sulaimaniya, Kirkuk and Arbil; Hindiya, Hit and Zubair; Diwaniya, Samawa, Nasiriya and Ramadi; and Hilla, Kut and Kerbala. However, the projects were shelved when money ran out.

In some cases — Kut, Ramadi and Samawa — first-phase work, designed by the UK's Haiste International, had been tendered but never awarded. First-phase designs have also been done — by Beller Consult — for Arbil, Kirkuk, Baquba and Dohuk.

In early 1985 SOWS announced that sewerage designs were ready for 14 projects to serve 2.3 million people in the governorates of Tamim, Arbil, Diyala, Anbar, Wasit, Muthanna, Dohuk, Nineveh and Salahaddin. It later added that studies

had been completed for Rumaitha, Shirkat, Sara Rush and Umm Qasr — much of the work was done by Beller Consult — and for Hamdaniya, Mahmoudiya and Samara, plus the second stage at Amara designed by Jennings O'Donovan.

SOWS is now believed to be studying the results of a tender for operating, maintaining and managing the first two stages of the Basra sewerage scheme. Preliminary operations were due to have started at the beginning of 1984, but the work was put out to tender following reports that Basra Sewerage Administration lacked sufficient resources to run and maintain the network itself.