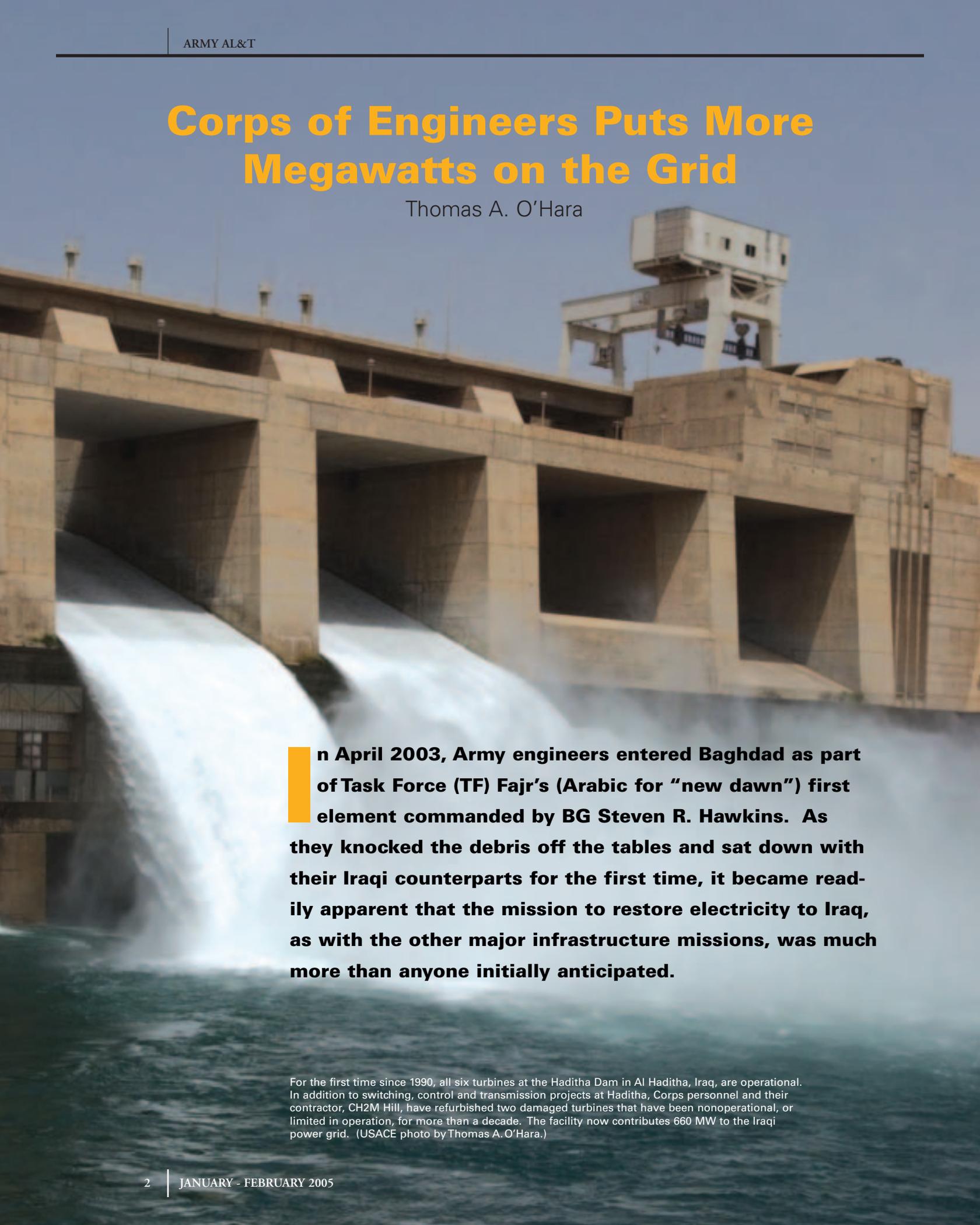


# Corps of Engineers Puts More Megawatts on the Grid

Thomas A. O'Hara



**In April 2003, Army engineers entered Baghdad as part of Task Force (TF) Fajr's (Arabic for "new dawn") first element commanded by BG Steven R. Hawkins. As they knocked the debris off the tables and sat down with their Iraqi counterparts for the first time, it became readily apparent that the mission to restore electricity to Iraq, as with the other major infrastructure missions, was much more than anyone initially anticipated.**

For the first time since 1990, all six turbines at the Haditha Dam in Al Haditha, Iraq, are operational. In addition to switching, control and transmission projects at Haditha, Corps personnel and their contractor, CH2M Hill, have refurbished two damaged turbines that have been nonoperational, or limited in operation, for more than a decade. The facility now contributes 660 MW to the Iraqi power grid. (USACE photo by Thomas A. O'Hara.)

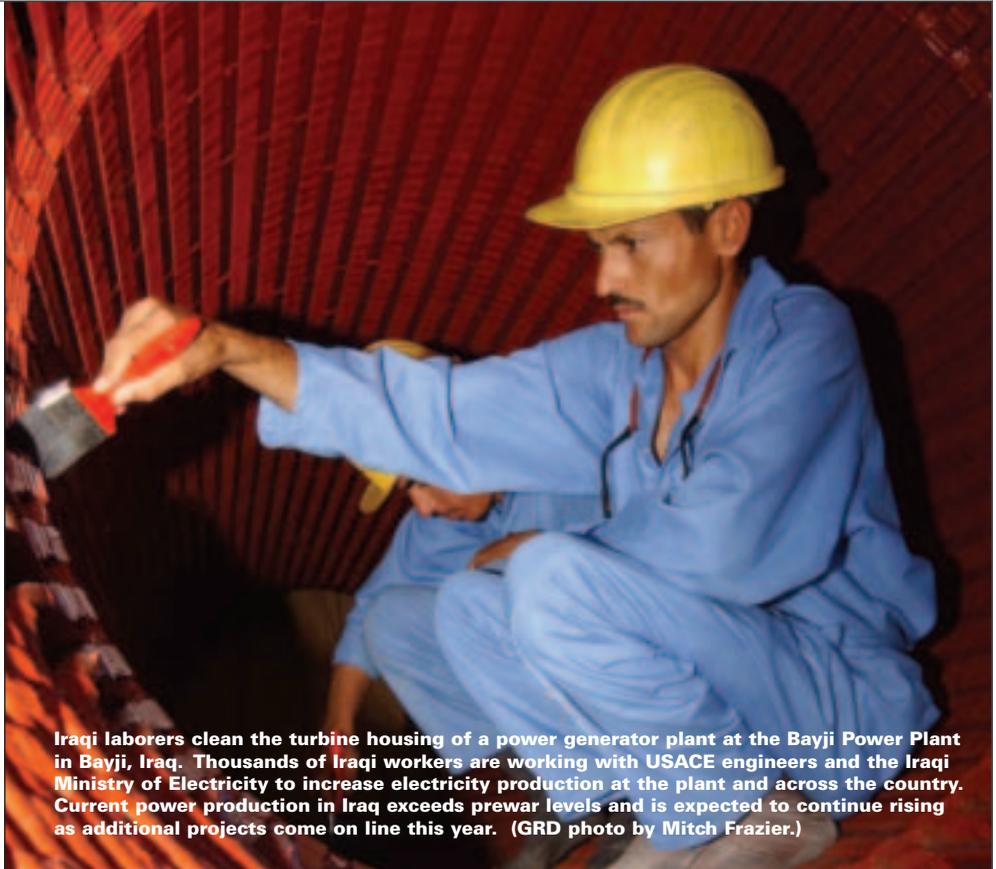
Prior to the hostilities associated with *Operation Iraqi Freedom*, Iraq's power infrastructure was already substandard because of deterioration and lack of investment under Saddam Hussein's regime.

Eighteen major power stations throughout Iraq had the potential to produce 10,000 megawatts (MW) of capacity. However, because of infrastructure degradation from neglect by the regime, the average prewar system production was only 4,400 MW. With the needs of Hussein's military facilities and Baghdad drawing priority from this system, peak demand was as high as 6,200 MW — 40 percent over capacity. This difference meant that most of Iraq was under limited power even before hostilities began. In addition, since Hussein often used the limited capacity to reward or punish, many outlying areas received electricity for only a few hours a day, while the capital and its Ba'ath Party members usually operated without interruption.

Complicating this initial effort was the National Distribution Center's



Iraqi employees stack rebar for the final phase of construction at the Basrah Water Treatment Plant in southern Iraq. Nearly 25 Iraqi laborers have worked on the \$1.3 million project to help restore basic service levels for the Iraqi infrastructure. (Gulf Region Division (GRD) photo by Bill Roberts.)



Iraqi laborers clean the turbine housing of a power generator plant at the Bayji Power Plant in Bayji, Iraq. Thousands of Iraqi workers are working with USACE engineers and the Iraqi Ministry of Electricity to increase electricity production at the plant and across the country. Current power production in Iraq exceeds prewar levels and is expected to continue rising as additional projects come on line this year. (GRD photo by Mitch Frazier.)

destruction. The loss, not from Coalition Forces bombing but from looters following the conflict, stripped the Iraq power grid's nerve center of computers, communications and other assets needed to control and monitor the system. Controllers were forced to coordinate with regional distributors by telephone — another service that was severely limited — and some regions failed to comply because of local resistance, threats or, in some cases, murder of commission employees by remaining Ba'ath loyalists.

**New Beginnings**

While the U.S. Army Corps of Engineers' (USACE) 249th Engineering Battalion (Primer Power) took on immediate and specific in-field power hurdles, their

USACE counterparts immediately began coordinating with existing Iraqi

power experts to develop the overall energy challenge solution.

As early as mid-July 2003, in combined efforts with the Ministry of Electricity and with initial projects coordinated through contracts with the U.S. Agency for International Development (USAID), USACE had restored national capacity to 3,200 MW on average, 70 percent of the prewar level. While this was still below the level prior to the conflict, most of Iraq's outer cities were already receiving more power than they were used to because of the more

equitable sharing of national assets. Baghdad, however, which now had to share limited resources with the rest of

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the country, had to adapt to a somewhat limited supply.

“In many accounts we’re actually at prewar levels, if not better, already,” said Peter Gibson, Coalition Provisional Authority (CPA) senior advisor for the Commission of Electricity, in July 2003.

In a summit meeting held July 16, 2003, at the Iraqi Forum conference center in Baghdad, coalition advisors and Commission of Electricity deputies met, for the first time, with power distribution representatives from 15 separate Iraqi regions, to present a plan for the system’s long-term recovery.

“Iraq is a wealthy country that is temporarily poor,” said Paul Bremer, CPA Administrator, as he addressed the group for the first time. “We have a big challenge that we will face together.”

The conference’s purpose was to introduce a new energy policy, to summarize activities to date and to direct power distribution, load-shedding plans and security measures to allow an equitable power utility for the Iraqi people.

The job to recover the country from this damage was a united effort led by Gibson and Karim Sahan, Interim



Iraqi Prime Minister Ayad Allawi thanks USACE and the United States’ efforts in rebuilding the nation’s electrical infrastructure as Minister of Electricity Dr. Aiham Alsammarae shakes hands with then GRD Commander MG Ronald Johnson. (USACE photo by Thomas A. O’Hara.)

Electricity Commission Director. After 2 months of patchworking the system back to current capacity, the next step was outlying operating provisions, and a long-term plan, to eventually restore the nation to full capacity as well as to educate its citizens about the need to cooperate to achieve their goals.

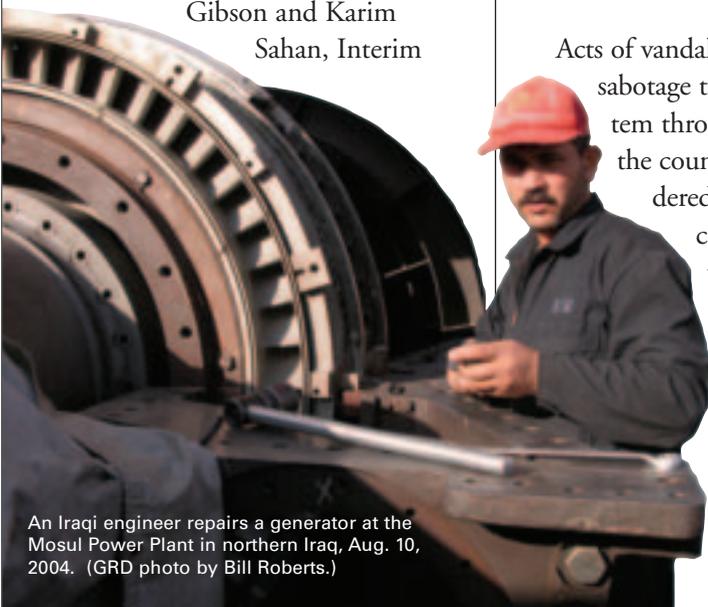
for the looters, caused thousands of dollars of damage to the infrastructure as well as unnecessary downtimes and limitations to the system that provided energy to the Iraqis.

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Because of these attacks, power system security became a priority for the CPA team and was specifically addressed in the Statement of Policy presented by Gibson and Sahan. “Acts against the infrastructure are considered acts against the Iraqis,” said Gibson.

Acts of vandalism and sabotage to the system throughout the country hindered the coalition team’s effort. In many instances, several kilometers of high-power cabling were torn down by looters to recycle the copper inside. This effort, resulting in mere dollars

The commission’s goal was to restore the national capacity to close to 4,000 MW by summer’s end 2003. One MW of electricity equates to enough electricity to support 3,000 Iraqi homes, compared to approximately 1,000 homes in the United States.



An Iraqi engineer repairs a generator at the Mosul Power Plant in northern Iraq, Aug. 10, 2004. (GRD photo by Bill Roberts.)

## Restoring Iraqi Electricity

In September 2003, as the grueling summer heat mounted, plagued by various shortages and blackouts, CPA officials and USAID decided a separate effort was necessary to expedite overall reconstruction efforts. Following the successful model demonstrated by USACE under TF Restore Iraqi Oil, the USACE tasked Hawkins to form the new TF Restore Iraqi Electricity (RIE).

The group of 80 USACE engineers and specialists hit the ground running to pursue more than 40 separate new and rehabilitated generation, transmission, distribution and control system projects — a program valued at more than \$1.5 billion. In short time, an additional 1,000 MW was added to the Iraqi energy grid.

That effort meant that the entire Iraqi population was getting roughly 18 hours of electricity a day — 50 percent more than what they were accustomed to. But TF RIE didn't stop there.

Since fall 2003, TF RIE efforts resulted in new projects as additional funds became available. It has also orchestrated controlled operations and maintenance of currently operating systems during the off-peak winter season to prepare for the higher load that comes with the typical summer demand.

As the TF has matured, so has the USACE command and control presence in Iraq. On Jan. 25, 2004, the new USACE Gulf Region Division (GRD) (Provisional) was activated, which brought division-level assets onboard, as a resource multiplier, and grouped TF RIE and other operating engineering teams under one command.

## Tough Summer

The combined TF RIE, USAID and Ministry of Electricity effort was on

pace to meet their new 6,000-MW capacity goal by July 2004 when insurgent efforts peaked in April 2004. Sporadic terrorist attacks on infrastructure, kidnappings and murder of contractor personnel deterred the overall effort but did not diminish the coalition's determination.

In early June 2004, combined efforts in restoring turbines and additional transmission systems brought the Haditha Dam in western Iraq to full capacity for the first time since 1990, adding a potential of 660 MW to the Iraqi power grid.

Across the country, more than 5,300 miles of conductor has been replaced or restored, representing the equivalent of enough conductors to cross the United States twice. This improvement provided added reliability and redundancy to the Iraqi power grid and minimized the

impacts of further terrorist attacks against the infrastructure.

Days before the official transfer of Iraq sovereignty from CPA to the interim government, Prime Minister Ayad Allawi stood at the newly improved Qudas power plant in northern Baghdad and thanked USACE for its determination to improve the quality of life for all Iraqis.

The project, executed by the "Engineering Corps of the U.S. military" represented one of many "presents, for the people of Iraq from the United States," said Allawi.

The capacity-generating effort was challenged by another factor of a free Iraq — emerging markets and the renewed buying power of the average Iraqi. "The demand line began to rise," said LTC Jeffrey Ogden, TF RIE Director. "People are buying and using more goods and

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Partnering for a Better Iraq. USACE and Ministry of Municipalities and Public Works (MMPW) leaders sign an Iraqi Internship Program Memorandum of Understanding to promote capacity-building potential for Iraq. (From left to right) Mahmoud Ahmed, MMPW Director General for Water/Planning and Follow-up; Ayad Al-Safi, MMPW Deputy Minister for Technical Affairs; Her Excellency Minister Nesreen Berwari, MMPW Minister; MG Ronald L. Johnson, then USACE GRD Commander; and Zana Rawandoozi, MMPW Director General for Human Services, sign this important implementing document. (GRD photo by Maria Or.)



USACE personnel work with local Iraqi workers to construct new switching facilities to augment rehabilitated power generators to assist the coalition partnership in reaching its 6,000 MW power generation goal by June 2005. (GRD photo by Thomas A. O'Hara.)

services that require more electricity, putting even more demand on the grid, which we are working hard to fill," said Ogden.

In late September 2004, the final stage for many of RIE's projects began as the newly constructed facilities were inventoried and turned over, officially, to the Ministry of Electricity.

Additional projects continued to be brought on line and, by October 2004, national capacity hovered near 5,300 MW, a remarkable accomplishment, even by USACE standards.

**Still More to Do**

With the stand-up of the new Iraqi government, the USACE and multinational

presence is no longer seen as an occupier but as a valued partner in the combined effort to rebuild Iraq's infrastructure. Falling under the Iraq Project and Contracting Office, an annex of the U.S. Embassy in Iraq, USACE continues to coordinate its efforts with USAID and Iraqi Ministries.

The GRD RIE Directorate is moving ahead to "put megawatts on the grid." GRD's commitment is surpassed only by the determination of the Iraqi engineers — who still brave local hostilities — as they work to better their own country.

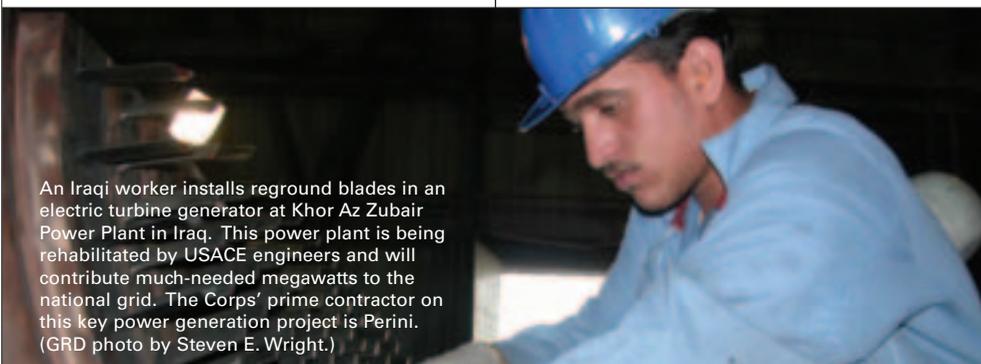
The focus for future projects has moved from capacity-generating priorities to local distribution and transmission

efforts. While insurgency attempts to undermine the effort continue, they are minimized by the ever-improving electrical infrastructure and the additional numbers of Iraqis involved in the rebuilding effort.

Several thousands of local tradesmen and engineers have worked on the more than three dozen TF RIE projects in the past year. If the multiagency team remains on schedule, the system should be able to achieve the 6,000 MW goal by the end of 2005, which will allow the entire country to operate at a higher industrial capacity and provide equitable electricity power levels throughout the country.

In the long term, the commission will upgrade existing facilities and provide added capacity, building a system fully capable of meeting Iraq's total residential and industrial power requirements by 2009.

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An Iraqi worker installs reground blades in an electric turbine generator at Khor Az Zubair Power Plant in Iraq. This power plant is being rehabilitated by USACE engineers and will contribute much-needed megawatts to the national grid. The Corps' prime contractor on this key power generation project is Perini. (GRD photo by Steven E. Wright.)

