

Darkhan, Mongolia

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PROJECT OVERVIEW

PPS period	Feb 2014 – July 2014
Focus sectors	Wastewater management; water supply
CDIA supported activities	(i) PPS on wastewater management and water supply (ii) Preparation of Integrated Urban Infrastructure Program (iii) Capacity development for Darkhan City Government
Linking to finance status	Funded by ADB and DAG



Background

Darkhan is the third largest city in Mongolia (after Ulaanbaatar and Erdenet) with an urban population of 75,000, of which an estimated 40% live in ger (traditional tent) areas. Darkhan is located 220 km north of Ulaanbaatar and 130 km south of the Russian Federation border. The city was founded as an industrial center in 1961 and it continues to play this role until the present time. To strengthen development of secondary cities and to mitigate migration of people to Ulaanbaatar, where almost half of the country's population resides, the Government of Mongolia, in 2012, identified Darkhan as a national model city for urban sustainability and livability with a vision of becoming a "smart and green city" by 2028. Moreover, the draft urban development master plan for Darkhan aims to improve existing urban districts and ger areas, expand industrial and residential areas and develop environmental protection zones particularly along the Kharaa river.

In pursuit of the above plans, the Darkhan local government

(Darkhan-Uul aimag*) has prioritized investments in water supply and sanitation fully recognizing the issues facing the sector. While Darkhan has good water resources, water quality problems are experienced at the point of delivery due to poor condition of the 50-year old pipe network resulting in an overall leakage rate of about 50% and non-revenue water level of 48%. Water supply and sanitation conditions in ger areas are poor with water supply only obtainable from water kiosks. Both water supply and sewer networks in apartments and low-rise housing in the core urban areas suffer from ageing and dilapidated infrastructure resulting in significant leakage and frequent system failures.

Built in 1965, the city's wastewater treatment plant (WWTP), sewer network and pumping stations are in urgent need of structural rehabilitation and replacement. Many components of the WWTP (designed for 50,000 cum/day but only operating at 9,000 cum/day) are out of commission while three

sewer sections and two pumping stations need urgent replacement. Frequent breakdowns of the existing wastewater collection and treatment system cause untreated water to discharge into the groundwater and the Kharaa River. Sanitation in ger areas comes in the form of on-plot pit latrines which cause soil and groundwater pollution. Ger areas are not served by the city wastewater system.

Darkhan-Uul Suvag (DUS), a public company fully owned by Darkhan-Uul aimag (DAG) is the sole institution responsible for water supply and wastewater management services in Darkhan city. For several years, DUS has been facing major challenges in running its business due to: (i) accumulated financial losses; (ii) ageing facilities, equipment and technologies; (iii) high operational and maintenance cost; (iv) high system losses; and (v) low water tariff.

In order to address the above issues and in line with the government plan to make Darkhan

* Aimag is the first-level administrative subdivision in Mongolia.

Darkhan has good water resources, but it has quality issues such as high level of non-revenue water. Particularly in ger areas, water supply can only be obtained from water kiosks.



Existing central wastewater treatment facility in Darkhan.

a “smart and green city” and a “model city for urban livability” by 2028, the local government of Darkhan submitted an application for technical assistance to CDIA in November 2012 in the following areas: (a) project preparatory study (PPS) of prioritized urban Water Supply and Wastewater Management Infrastructure Improvement Project for the city of Darkhan; (b) development of an Integrated Urban Infrastructure Investment Program (as part of the PPS); and c) enhancing the capacity of the city government to prepare, implement and operate public infrastructure projects in the water supply and sanitation sector.

As part of its internal monitoring and evaluation processes, CDIA conducted the tracer study in Darkhan City in April 2018 to track progress, effectiveness and results of its completed interventions. Following is a summary of the tracer study findings.

Progress of Implementation as of March 2018

Following the approval of the city application, CDIA deployed a consulting team to Darkhan to assist the city in preparing the PPS and an integrated urban infrastructure investment program from February to July 2014. Working closely with the Darkhan local government, the consulting team completed the PFS on Water Supply and Sanitation Infrastructure Improvement Project for Darkhan in July 2014 with the following short-term (up to 2020) recommendations: a) monitoring of water extraction; b) rehabilitation of 27 km of water pipelines and reduction of leakages from 48% to 35%; c) rehabilitation of water pipelines in 17 apartment basements; d) remote controlled monitoring of 4,000 water meters; e) rehabilitation of 6.2 km of existing sewer pipelines; f) rehabilitation of booster pumps in 3 sewerage pumping stations; g) construction or rehabilitation of central wastewater treatment plant; and h) extension of water supply and sewerage services in ger areas.

Over the long-term (up to 2030), the CDIA consulting team recommended the following: a) remote monitoring of wells and control of groundwater pumps; b) rehabilitation of 30 km of water pipelines and reduction of leakages from 35% to 15%; c) remote controlled monitoring of 3,277 water meters; d) rehabilitation of 20 km of existing

sewer pipelines; e) remote control operation of 3 pumping systems; f) optimized daily operation process of central wastewater treatment plant; and g) extension of water supply and sewerage services in ger areas.

Wastewater Management

Project Component. Prior to the PPS completion in July 2014, the Government of Mongolia was able to secure a technical assistance (TA) grant from ADB for the preparation of the Darkhan Wastewater Management Project. Taking into consideration the key recommendations of the CDIA PPS, a comprehensive TA report on the Darkhan Wastewater Management Project was completed in September 2014. Subsequently, the \$18.5 million ADB loan (Loan 3244-MON/ Loan 3245-MON) and a \$0.4 million TA for the Darkhan Wastewater Management Project were approved in December 2014.

In line with the CDIA-proposed strategy and investment program for the wastewater sector, the project aims to improve the system for wastewater collection and treatment in Darkhan and deliver the following outputs by 2020: i) improved wastewater treatment plant (WWTP) with capacity increased from 12,000 cum/day to 16,000 cum/day; ii) rehabilitated pumping stations and sewer pipes; and iii) improved project management capacity of DAG (see Table 1 for details).

As of March 2018, project implementation is ongoing with the

Table 1: Darkhan Wastewater Management Project: Outputs, Targets and Cost

Outputs	Targets	Cost (mil \$)
1. Improved wastewater treatment plant	WWTP process improved and capacity increased from 12,000 cum/day to 16,000 cum/day; wastewater effluents meets national standards	15.00
2. Rehabilitated pumping stations and sewer pipes	Two pumping stations renovated and fully equipped, operating efficiently at 10% reduction in operating cost; 1.8 km of sewer pipes replaced	1.67
3. Project management and capacity development	New operational and financial management systems installed at DUS; 10 training sessions on financial management, project management and O&M of WWTP; tariff increase reviewed, proposed and considered	1.80
Total		18.47

Source: ADB. 2014. *Report and Recommendations of the President to the Board of Directors: Proposed Loans and Technical Assistance Grant to Mongolia: Darkhan Wastewater Management Project*

DAG as the lead implementing agency supported by Project Management Unit (PMU) and a local project steering committee. Under the DAG supervision, a Project Implementation Unit (PIU) has been established within the DUS for managing and supervising project implementation. Two national competitive bidding contracts for rehabilitation and construction of heating supply pipelines and sewers and the international competitive bidding contract for improvement of WWTP and pump stations have been awarded.

Consultants were mobilized in September 2016 to provide project management and capacity development support including preparation of bidding and contract documents, developing detailed design and tender documents and delivery of trainings, safeguards reports and action plans.

Project implementation is on track and progress was assessed by the ADB mid-term review mission

dispatched in March 2018 as satisfactory. In 2017, the project encountered a minor delay when the DAG did not comply with ADB procurement guidelines but the PMU was able to promptly address this issue. Savings realized by the Project Management Office in the amount of \$1.5 million will be realigned and used for rehabilitation of an additional 8 km of sewer pipelines previously identified and prioritized in the CDIA PPS.

Water Supply Project Component.

Key PPS recommendations that were implemented by the DUS and DAG after 2014 include: a) water extraction monitoring under the German-funded Integrated Water Resource Management Project (MoMo project); b) rehabilitation of water supply pipelines; c) rehabilitation/ replacement of pipelines in basements of apartment buildings; d) installation/ replacement of water meters; and e) improvement of access to water supply services in ger areas.



Ongoing maintenance works of sewer pipes near the WWTP

As a result of above initiatives, water connections increased from 50% to 65% of household population while non-revenue water (NRW) was reduced from 50% in 2014 to 23% in 2017. NRW level is expected to further decline with the continuous rehabilitation of water supply network being undertaken by DUS.

In the absence of external support, the water supply project component recommendations were implemented using local and state budget. Depending on the government's fiscal position in a given year, public investment in water supply sector ranged from \$0.15 million to \$0.75 million annually. Over the next four years, DAG has programmed \$2.5 million for water pipeline rehabilitation.

While extension of water supply network to ger areas has yet to be realized, improvement of water and sanitation is included in the Darkhan Governor's Action Program 2020. According to the Director of Operation and Maintenance Department of DAG, this action program took into account the strategy for extension of water supply into the ger areas recommended by the CDIA PPS team.

Capacity Development

Component. The CDIA PPS carried out in 2014 adopted a participatory approach with the study team working closely with the Project Steering Committee (PSC) composed of local counterpart staff



Smart water kiosk supplying the water needs of ger area residents.

from DUS and DAG. From time to time, intensive discussions were held with all key stakeholders at national, aimag, soum (district) and household level to ensure responsiveness of the proposals to stakeholder needs. During the PPS implementation, training activities were conducted on infrastructure planning and operation and maintenance of water supply and sanitation facilities. Moreover, the PSC was involved in lengthy discussions regarding water supply and wastewater technology options and two PSC members were sent to Singapore to participate in the Effective Urban Infrastructure Planning (EUIP) training in 2014.

Apart from formulating an infrastructure investment plan, the CDIA PPS recommended capacity development measures aimed at establishing a sustainable water supply and

wastewater management service provider. Following the PPS recommendations, a capacity development TA funded by a \$0.4 million grant from the Urban Environmental Infrastructure Fund (UEIF) was attached to the ADB loan with the primary objective of improving the effectiveness and efficiency of the DUS.

The UEIF-funded TA was implemented through a German consulting outfit from September 2016 to June 2017. With DUS as the main beneficiary, the TA was able to deliver the following outputs: (i) institutional, financial and operational performance assessment; (ii) institutional improvement action plan; and (iii) capacity building, training and action plan implementation support. Guided by the TA recommendations, the DUS has started implementing key

institutional reforms including: (i) increase in water tariff for households by 30% and for industrial and commercial users by 45% in October 2017; (ii) adoption of a new organizational structure including outsourcing of non-core businesses; and (iii) preparation and approval of the 2018 business plan using the template developed by TA consultants. Per the TA completion report of the ADB Project Officer, these reforms have substantially improved the financial position and operational efficiency of the DUS.

“The capacity building program for DUS, initiated by CDIA in 2014 and sustained under the ADB loan has resulted in improved financial position of the DUS ”

- Ms. Tuul Badarch, Sr. Project Officer (Infrastructure),
ADB Mongolia Resident Mission

Table 2: Project Accomplishments as of March 2018

Outputs	Accomplishments
1. Improved wastewater treatment plant	Contract A1 for improvement of WWTP and pump stations was signed in Dec 2017 with the successful bidder through ICB process. The contract commenced on 4 Jan 2018 and expected completion date is 10 June 2020, which will be followed by a 12 month O&M support.
2. Rehabilitated pumping stations and sewer pipes	The output includes two civil work packages: (1) rehab of a 1.1 km-long dual district heating pipe and installation of new equipment for the pumping station No. 3 (Package A2-1); and (ii) renovation of 7.4 km sewerage system pipelines (Package A2-2). These two civil works were procured through NCB procedures. Commenced on 11 August 2017, civil works will be completed on 30 October 2018. Progress of the contract A2-1 and contract A2-2 is 36% and 41% respectively. Due to completion of the construction season, the civil works were stopped in November 2017 and will resume in April 2018.
3. Project management support and capacity development	Consultants were mobilized in September 2016. The consultants: (i) prepared employer’s requirements and bidding and contract documents for Package A1; (ii) developed detailed design and tender documents for Output 2 civil works contracts; (iii) assisted the Ministry of Construction and Urban Development (MCUD) and DAG in the technical and financial evaluation of Package A1 bids; (iv) delivered trainings, safeguards reports and action plans, and other deliverables per the terms of reference.

Intervention Results

The CDIA-proposed strategy and investment program for water supply and sanitation improvement aimed at modernizing and expanding the water supply and sanitation system in Darkhan with a view towards: (i) enhancing the service access by residents; (ii) improving system efficiency and sustainability; and (iii) providing an attractive environment for investment. In line with these strategic objectives, the Darkhan local government has gradually implemented projects identified in the investment plan using internal and external resources. Based on interviews with key officials of Darkhan city government, these projects have, so far, yielded positive results that can be attributed to the CDIA intervention in 2014.

Enhanced access to water supply services. Guided by the investment plan prepared by CDIA in 2014, the DUS has implemented rehabilitation works on the water supply network including replacement of old and dilapidated pipelines in basements of apartment buildings and installation of water meters in all service areas. These initiatives have reduced the proportion of water lost as NRW from 48% in 2014 to 23% in 2017 and increased the water service connections from 56% to 60% of 12,600 households in Darkhan soum. Although households in ger areas have yet to be connected to

the network, water kiosks directly connected to the network increased from 38 in 2014 to 50 in 2017, over half of which are now connected to the water supply network.

Improved capacity of water supply and wastewater management service provider.

According to the ADB project officer, the capacity building program for DUS initiated by the CDIA PPS team in 2014 and sustained from 2016 to 2017 under the UEIF grant-supported TA attached to the ADB loan has resulted in improved financial position of the DUS. Total revenues of DUS increased by 17% from \$1.48 million in 2016 to \$1.73 million in 2017, while financial losses have been reduced by almost 60% from \$0.58 in 2016 to \$0.24 million in 2017. Based on the

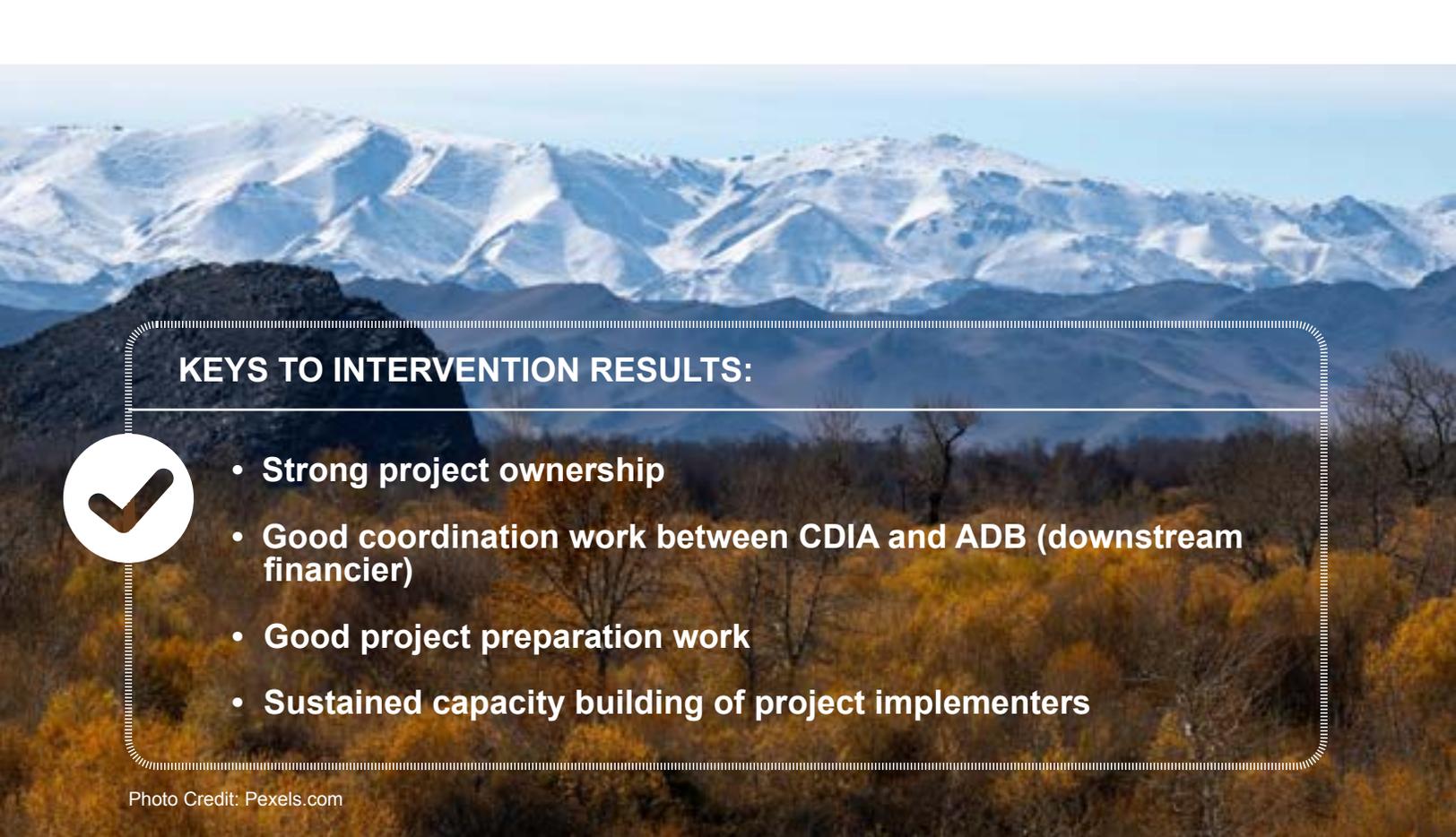
TA completion report of the ADB project officer, this can be largely attributed to the institutional reforms implemented by the DAG and DUS in 2017.

Replication of the Darkhan experience in other aimags -

inspired by the Darkhan experience, nine aimags in Mongolia will soon implement wastewater projects with the support of ADB. Good practices in Darkhan such as preparation of strategic investment plan with the active participation of local stakeholders, establishment of a project steering committee and building the capacity of service provider will be replicated thereby achieving the original PPS objective of establishing Darkhan as a model of excellence in urban water supply and sanitation services.



One of ger areas to be covered by future DUS service expansion



KEYS TO INTERVENTION RESULTS:



- **Strong project ownership**
- **Good coordination work between CDIA and ADB (downstream financier)**
- **Good project preparation work**
- **Sustained capacity building of project implementers**

Photo Credit: Pexels.com



Conclusion and Lessons Learned

Overall, the findings of this tracer study show that significant progress has been made by the city of Darkhan in implementing the recommendations of the PPS on Water Supply and Sanitation Infrastructure Improvement Project whose preparation was supported by CDIA in 2014. Factors that facilitated the implementation of key recommendations in the PPS include: (i) strong ownership of the PPS and urban infrastructure investment plan by the local government; (ii) good coordination work between the CDIA PPS team and the ADB TA consultants; (iii)

good project preparation work done by CDIA mobilizing the active participation of key stakeholders in the city; and iv) sustained capacity building of key officials of DAG and DUS.

Key lessons learned from the Darkhan experience include the following: (i) ensuring that key stakeholders take full ownership of the strategic investment plan and the PPS by engaging them in all phases of project preparation; (ii) importance of creating a Steering Committee composed of suitable counterpart staff with clear roles

and responsibilities during TA implementation; and (iii) value of ensuring continuity of capacity development program of PPS counterparts in subsequent project preparation and implementation activities. Moving forward, the ADB project officer in charge of the Darkhan Wastewater Management Project noted that the lessons from Darkhan will be very useful in the ongoing effort of the government and ADB to improve the system of wastewater collection and treatment in nine other aimags in Mongolia.

