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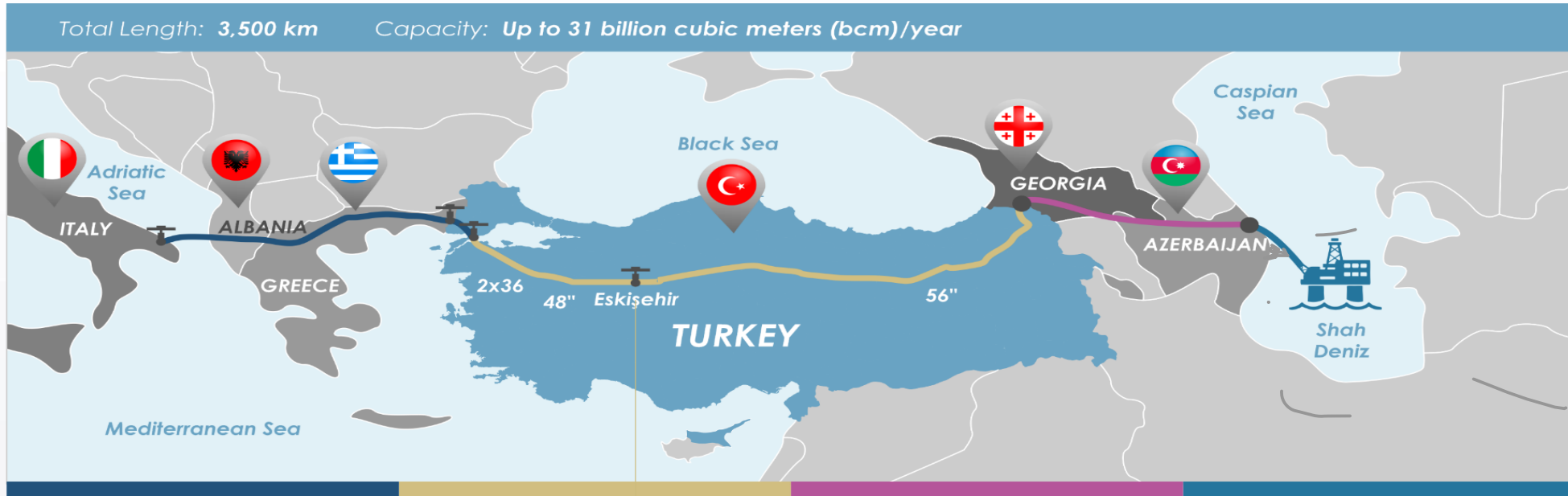
Planning and Implementing Brownfield Projects on Operational Facilities

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Baku, March 2022



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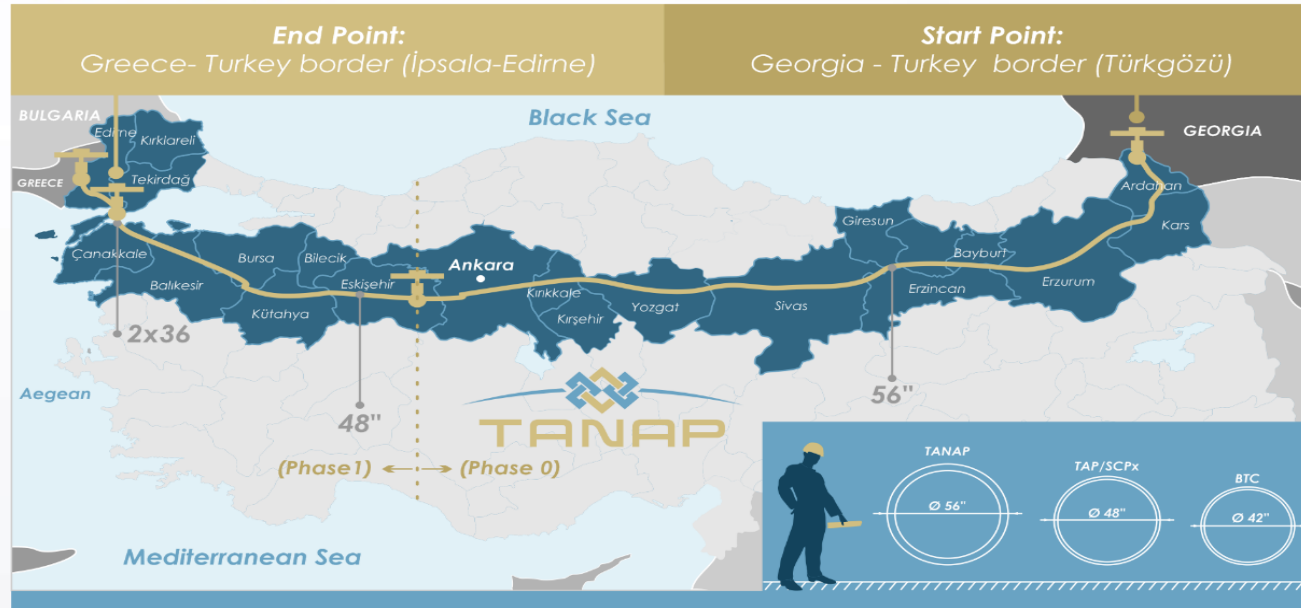
Trans Anatolian Natural Gas Pipeline (TANAP)

 Turkey - 1811.7 km

Total Length:
1811.7 km

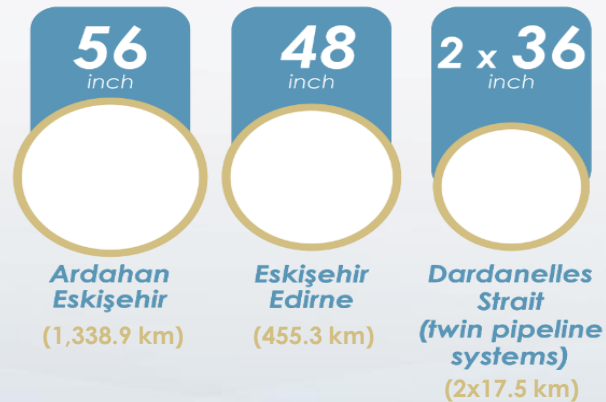
Shareholders

 SGC 51%	 SOCAR 7%	 BOTAŞ 30%	 BP 12%
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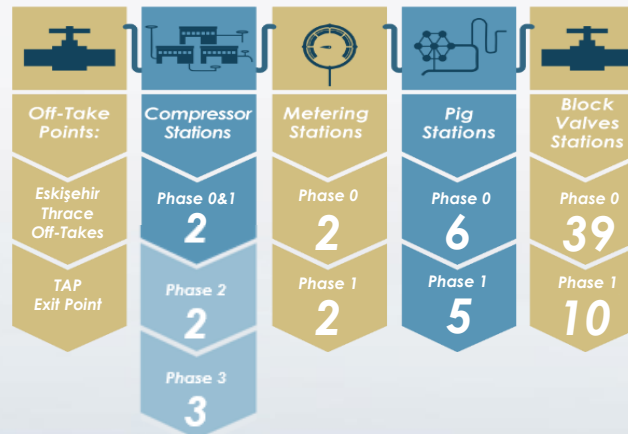


GAS TRANSMISSION CAPACITY	
PHASE 0 CAPACITY 2018	6 bcm/y
PHASE 1 CAPACITY 2019	16 bcm/y
PHASE 2 PLANNED CAPACITY	24 bcm/y
PHASE 3 PLANNED CAPACITY	31 bcm/y

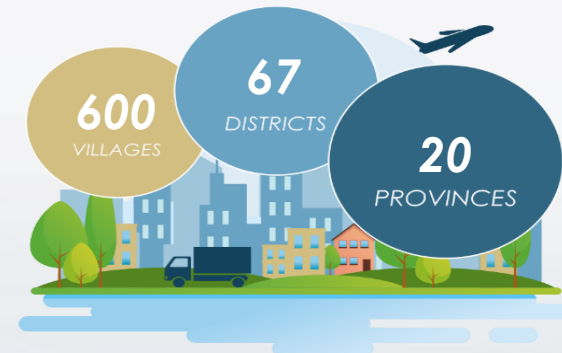
PIPELINE (1811.7 km)



STATIONS (FOR 31 bcma)



PIPELINE ROUTE



- **Groundbreaking Ceremony** of TANAP was held in Kars on **17th March 2015**.

Gas to Turkey (Phase 0):

- **Commercial Operations** commenced on **30th June 2018** as planned.

Gas to Europe (Phase 1):

- TANAP became available for Commercial Operations as of 26 November 2019.
- **Commercial Operations** commenced on **31st December 2020**.





Greenfield vs. Brownfield Projects

- Oil and gas industry will continue to thrive and has much to offer in the future.

Greenfield Projects:

- A greenfield project is one that lacks constraints imposed by prior work. The analogy is to that of construction on a greenfield land where there is no need to work within the constraints of existing buildings or infrastructure.

Brownfield Projects:

- Brownfield projects are expansions or upgrades of existing facilities / fields.
- Brownfield development is a term commonly used to describe problem spaces needing the development and deployment of new facilities / systems in the immediate presence of existing (legacy) facilities.
- This implies that any new brownfield project must take into account and coexist with live facilities already in situ.

Brownfield project execution involves many unique challenges that are not generally encountered in Greenfield development:

- Key **design challenges** usually faced during Brownfield project execution include:
 - Limitations in existing design, especially for equipment / systems not adequately addressed in Front End Engineering Design (FEED) such as utility systems, flare systems, layout constraints, safety related design requirements, tie-ins etc.
 - Incompatibility between the existing and new equipment / systems.
 - Data / Estimates on health of existing equipment.
 - Availability of current asset documentation / as-built data in electronic format.
 - Discrepancies between design codes / standards used in existing systems versus latest codes / standards.











- Other challenges (not limited to) of Brownfield project execution:
 - Safety challenges
 - Schedule challenges
 - Cost challenges
 - Construction challenges
 - Interfaces management

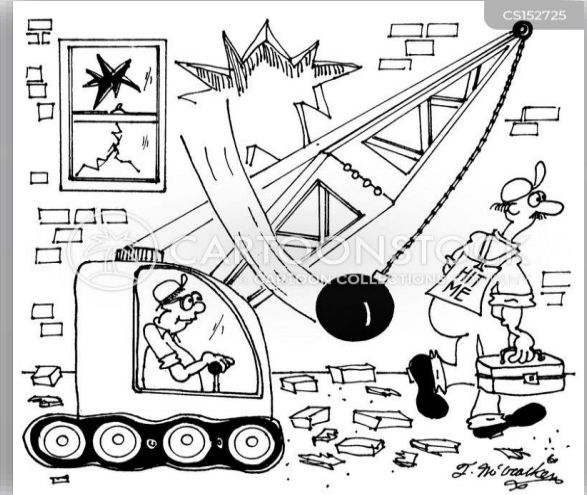


Working in congested areas near live facilities:

- Human Safety
- Process Safety
- Damage to Environment

The Golden Rules of Safety cover the following activities:

-  **Permit to work**
-  **Ground disturbance**
-  **Confined space entry**
-  **Working at heights**
-  **Energy isolation**
-  **Lifting operations**
-  **Driving safety**
-  **Hot work**



Difficult to properly **plan and schedule efforts required** for:

- Design
 - lack of details and understanding of existing facilities.
 - need for several iterative design cycle to ensure compatibility and alignment
- Procurement planning
 - need to wait until completion of design
 - need to ensure compatibility with existing equipment
- Construction planning
 - Estimating time required for solution of unknown problems that may be encountered
 - Aligning construction activities with the Operations – minimize interruption to existing operations
 - Planning the timing of tie-ins, need to wait for appropriate windows.



- Cost of unknowns
- Cost of site preparation
 - Cleaning of (contaminated) soil,
 - demolition, remediation
- Cost of construction (may be higher than greenfield equivalents due to restrictions and additional measures to be taken)
- Cost of restoration
- Higher insurance costs
- Cost of interruption (production cuts, operational outages, etc.)





Brownfield Projects Construction challenges

- Physical constraints at sites
- More rigorous safety measures are required to be taken
- Demolition, remediation, etc. of existing facilities
- Preserving existing facilities / infrastructure (known and unknown)
- Aligning construction activities with the Operations – minimize interruption to existing operations.



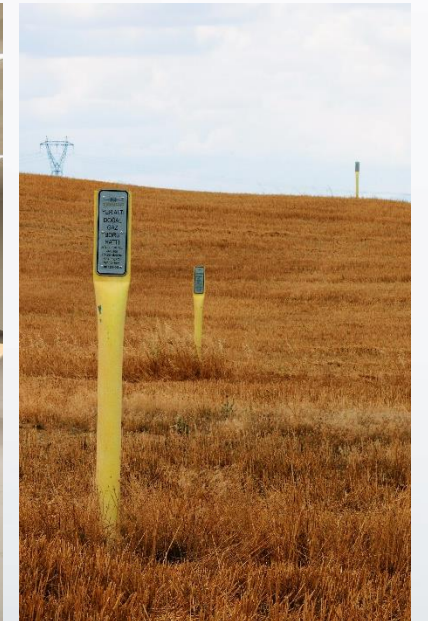
Trans Anatolian Natural Gas Pipeline Project

- Input from Operations
- Input from Integrity Management / Inspections
- Production / Operations related priorities / targets
- Budget restrictions
- Management of Change Process
- Permit to Work System





TANAP Facilities



Trans Anatolian Natural Gas Pipeline Project





Thank You