

Dandenong LNG Capacity and Reserves for Winter 2021

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Important Notice

Purpose

AEMO has prepared this presentation material to provide information about the operation of the Victorian gas transmission system and the market operational strategies for Winter 2021, as at the date of publication.

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Dandenong LNG (DLNG)

- DLNG is a key piece of infrastructure in operating the DTS
 - Located close to Melbourne where there is ~70% of system demand
 - Injections can be ramped up quickly
 - Can provide rapid improvement to critical system pressures
 - Additional DTS pipeline capacity and compression capacity would be required without DLNG
- Other injection sources can be used to respond to threats, however they are far less effective, and need to be scheduled 4-6 hours earlier.
- Other injection sources are not effective against threats that manifest quickly on high demand days:
 - Supply source disruptions
 - Large unforecasted demand increases
 - Transmission equipment failure



What is DLNG Used for?

DLNG is injected into the DTS:

1. In merit order by Market Participants to manage imbalance positions or in response to high DWGM gas prices – **“Market Use LNG”**
2. Out-of-merit-order to prevent breaches of critical system pressures in response to a short-term threats to system security – **“Threat to System Security LNG”**
3. Emergency response to a major loss of supply or transmission equipment failure to support critical system pressures while curtailment of load occurs – **“Safe Shutdown LNG”**

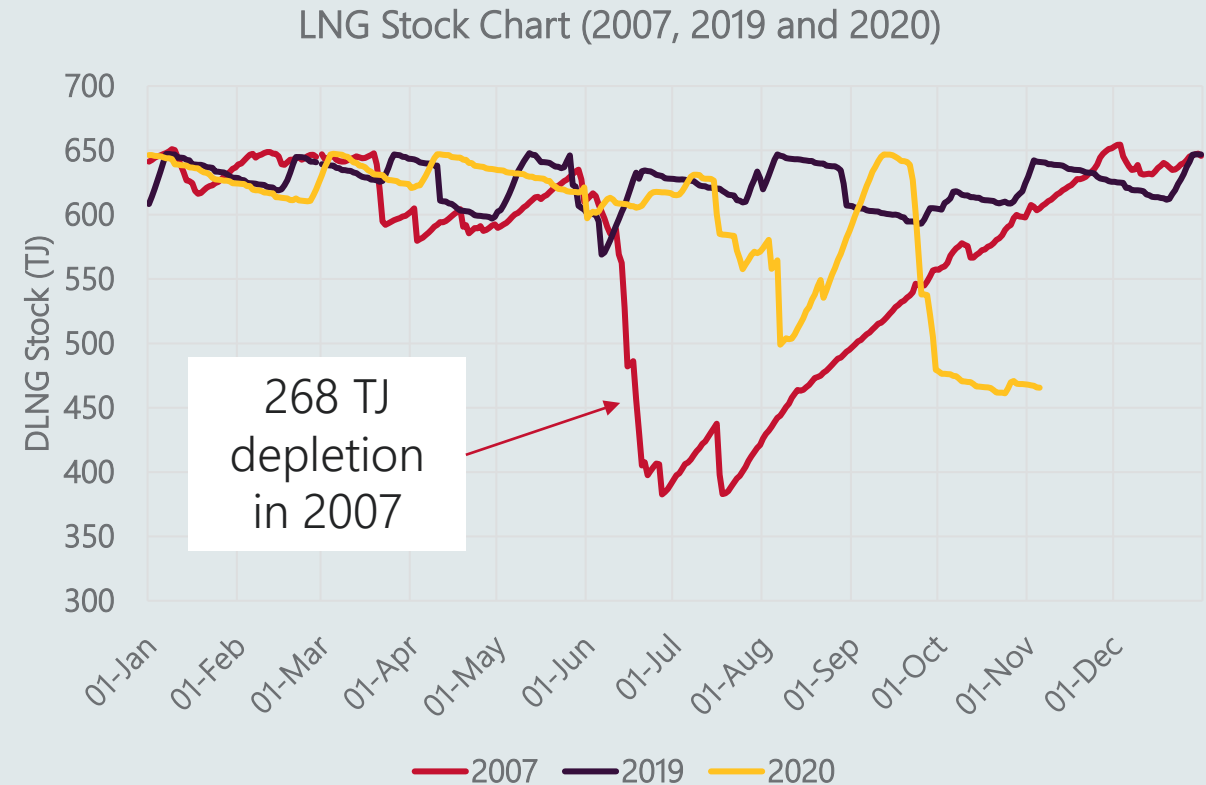
AEMO only
concerned with LNG
used for Threat to
System Security
and Safe Shutdown

Threat to System Security

- Prior to the publication of the 2021 VGPR only 80 TJ (1,450 tonnes) or 12% of DLNG capacity had been contracted by market participants out of 680 TJ (12,000 tonnes)
- Contracted supply capacity was 4.5 TJ/h, which is less than the DLNG firm capacity of 5.5 TJ/h (non-firm capacity is 9.9 TJ/h)
- AEMO issued a threat to system security requesting a market response seeking:
 - 110 TJ of capacity to manage operational and market responses during periods of high unforecasted demand or supply disruptions; plus,
 - 140 TJ of capacity to provide an emergency reserve to minimise risks to safety, as far as reasonably practicable, that arise due to interruptions or the reinstatement of gas supply (therefore 250 TJ total)
- Market participants have responded increasing the contracted capacity to 188 TJ during the week ending 30 April 2021 (last week)
- APA inventory of 80 TJ is to maintain minimum operational level including keeping the tank cold and cannot be withdrawn
- Historically, the LNG tank has been full heading into the winter period
- AEMO is reviewing the market response

Historical LNG depletion

Year	Threat to System Security Events	Threat to System Security LNG (TJ)	Market LNG (TJ)	Total LNG (TJ)	Maximum LNG Level Depletion (TJ)
2016	0	0	138.4	138.4	150 TJ
2017	2	35.8	14.5	50.3	80 TJ
2018	0	0	58.3	58.3	60 TJ
2019	3	44	76.3	120.3	80 TJ
2020	4	135	246	381	150 TJ



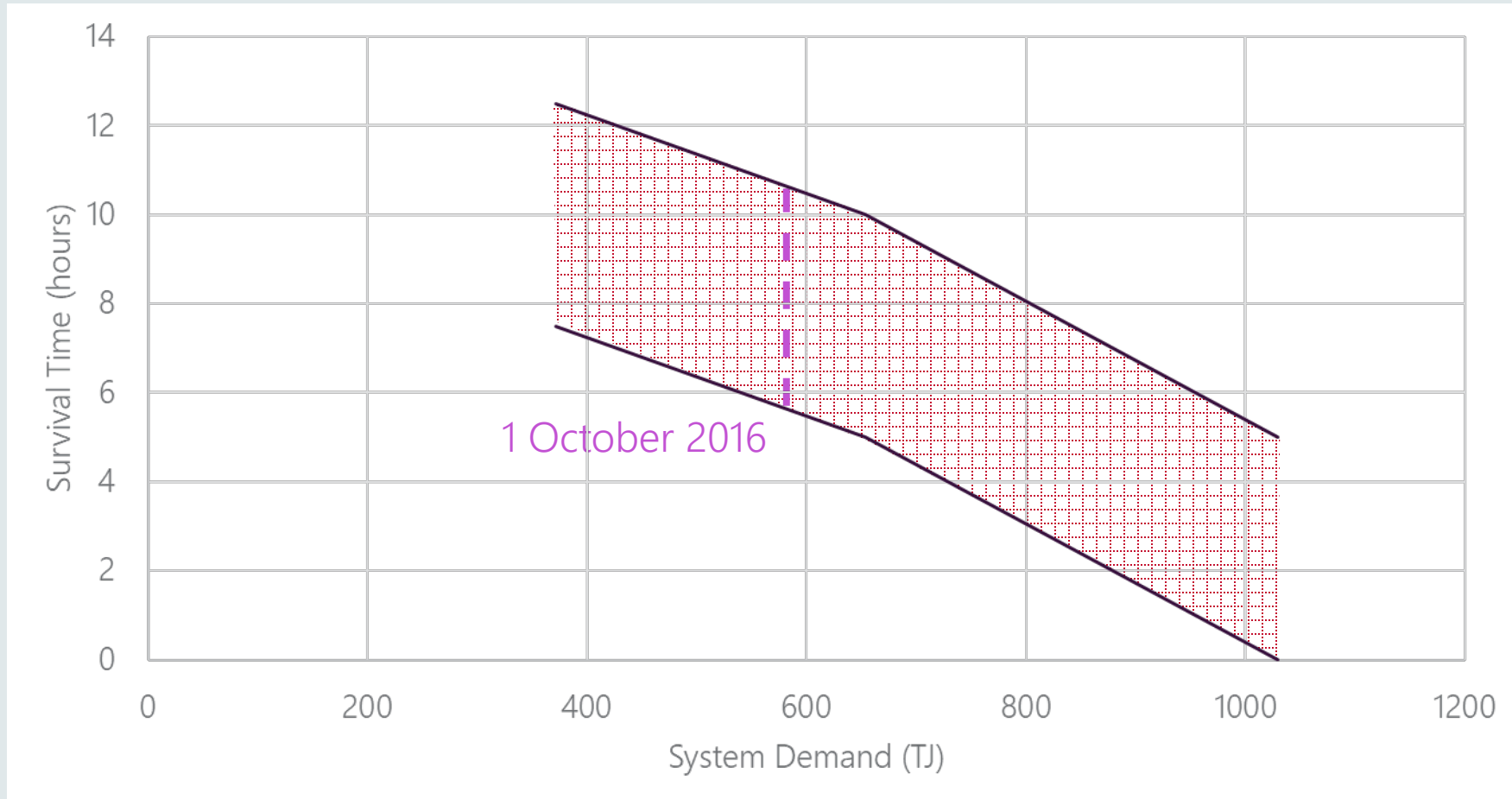
Major LNG Depletion Events

- Since the major Longford incident in 1998 there has been two 6-7 hour unplanned full Longford plant outages (prior to the start of the gas day on 1 October 2016 and overnight in April 2004). Several partial Longford outages have occurred during winter along with unplanned Iona UGS outages.
- During the 1 October 2016 incident, **116 TJ of LNG** was scheduled during the 9am market intervention ("ad hoc") schedule. This was reduced to 75 TJ at the 10am schedule.
- System demand was 620 TJ – had Longford not returned to service there was not sufficient gas supply without LNG, low level curtailment would have been necessary.
- This would have been an Emergency had the situation occurred on a higher demand day.

Longford Gas Plant supply disruptions

Response	Single plant outage	Two plant outage	Full facility outage
Threat to System Security	Yes		
Peak shaving LNG	Injection at maximum rate		
Alternative supply	Increase Iona UGS, VNI and SWP flows where achievable		
Curtailment	Unlikely	Localised within Gippsland or potentially some in Melbourne	Most likely in Gippsland, Northern and Melbourne regions

Longford trip – 1 October 2016



Determining the Threat to System Security LNG Quantity

- Two Step Approach:
 1. Model the LNG required for a defined set of threat to system security events
 2. Assign probabilities to each event and perform a Monte Carlo analysis to produce a probability distribution of required Dandenong LNG tank volumes.
- The Monte Carlo analysis:
 - Simulated 25,000, 120-day winters
 - Assumed an LNG tank refill rate of 6 TJ/d
 - Assumed all events were independent, which could happen coincidentally

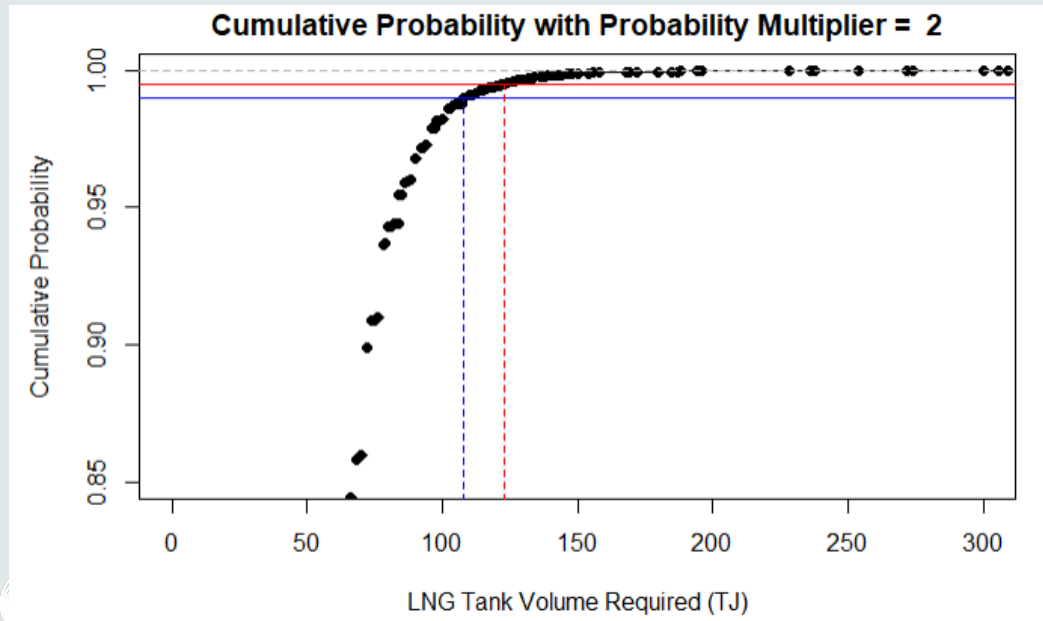
Events Considered

- Longford partial trip
- “Regular” Threat to System Security event
– large under-forecast demand
- Key transmission asset unavailability
- Coal unit failure driving extra GPG usage
- Extended outage of Longford train
- Extended outage of Iona facility

Probabilities
conservatively assigned
based on available data.

Threat to System Security LNG Quantity

Case	Probability Multiplier	LNG tank volume for 1% POE
1	1	74 TJ
2	2	110 TJ
3	2.5	133 TJ
4	3	156 TJ



- Analysis determined the DLNG inventory that was sufficient for 99% of independent modelled loss of supply events (1% POE) which corresponds to the lowest probability rating in AS2885
- Due to model limitations and uncertainties (e.g. some events are not independent), it is prudent to apply a probability multiplier of two, and therefore determine **110 TJ** to be the Threat to System Security LNG quantity.
- This is less than the LNG depletion in 2016 (150 TJ) and 2020 (150 TJ), noting that market use LNG contributed to these depletion levels.
- AEMO considers that the depletion in 2007 (268 TJ) due to severe drought and DTS capacity limitations to be a remote possibility.

Determining the Safe Shutdown LNG Quantity

- Hydraulic pipeline modelling was performed
- **Scenario:** Total loss of Longford supply for 24 hours or more, requiring curtailment
- Curtailment response assumed to be per the 1998 Longford emergency event
- Pressure breaches are inevitable in this scenario
- LNG is injected to reduce the extent of these pressure breaches, by minimising DCG flow.

Scenario	Longford Trip Time	Demand	Curtailment Response	LNG Required
a)	1pm	1,150 TJ	100%	84 TJ
b)	1pm	1,214 TJ	100%	98 TJ
c)	1pm	1,150 TJ	80%	93 TJ
d)	1pm	1,214 TJ	80%	98 TJ
e)	6am	1,150 TJ	100%	88 TJ
f)	6am	1,214 TJ	80%	117 TJ



Safe Shutdown LNG

- Worst modelled scenario is 117 TJ of LNG
- LNG requirement could be greater if:
 - Longford were to trip overnight
 - Curtailment response is weaker
 - Longford trip is coincident with an outage/trip at Iona, Culcairn or BassGas
 - A key transmission asset is unavailable
- Curtailment is an untested process
 - Retailers' curtailment process expected to require ~4 hours until load reduction commences
 - Voluntary curtailment is an untested process creating uncertainty around the response
- **Considering the modelling and curtailment response uncertainties, a buffer of 20% above the maximum requirement of 117 TJ has been applied, resulting in a safe shutdown quantity requirement of 140 TJ.**
- This is less than the historically held safe shutdown volume of 3,000 tonnes (~165 TJ).

Scheduling

- Notice of a Threat to System Security required for scheduling profiled DLNG injections (peak shaving gas) vs. market response LNG
- Directions may be issued if insufficient DLNG capacity is available in the bid stack
- AEMO is reviewing its scheduling processes for DLNG
- APA are to ensure that DLNG is utilised with the objective of maintaining the LNG stock (i.e. contracted capacity) at the highest level possible per the NGR

Projects and Wrap-up

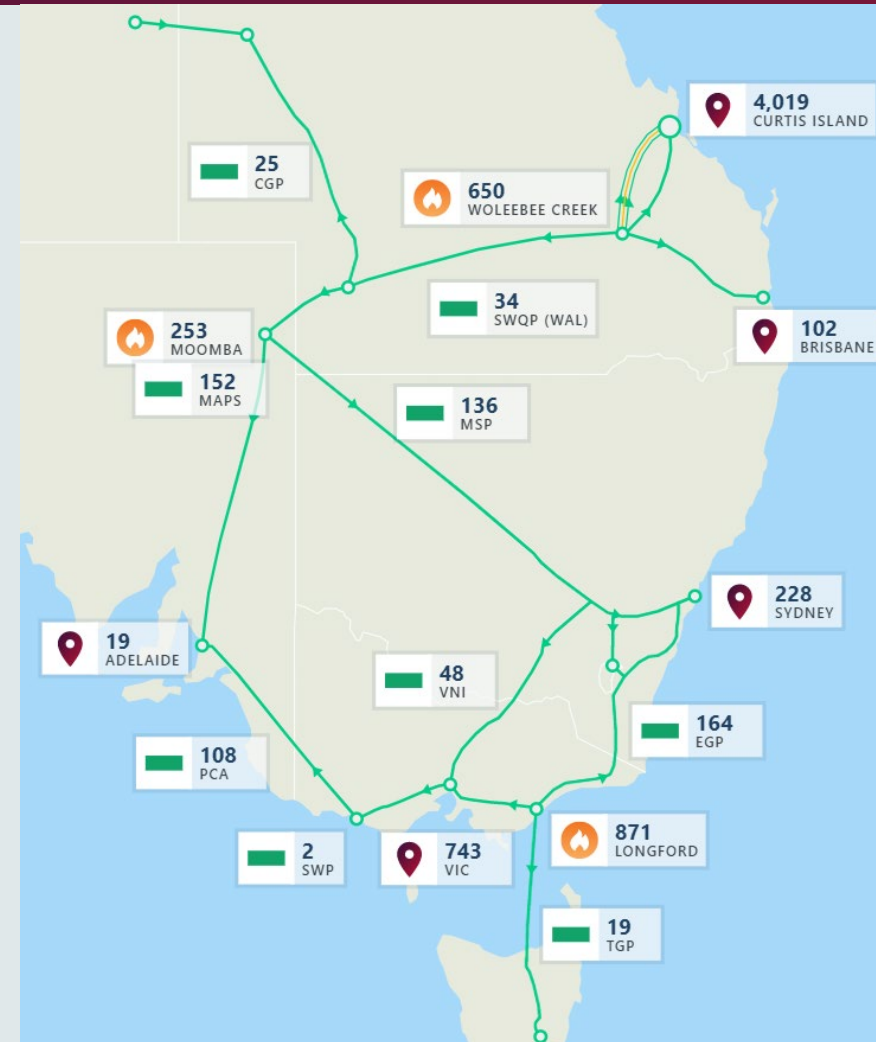
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DWGM Enhancements and Gas Supply Guarantee

- DWGM Enhancements
 - AEMO publication of Procedures on Thursday 6 May
 - Finalising IT scoping and design
 - Market Trial starting June 2022, followed by first auction in October 2022
 - Market changes effective from 1 January 2023
- Gas Supply Guarantee
 - Three year mechanism introduced on 15 March 2017, implemented prior to summer 2017.
 - Extended by another three years from 31 March 2020
 - AEMC currently consulting industry to determine requirements

Gas Transparency Measures

- Gas Bulletin Board changes
 - New user types and associated submissions
 - Large gas user facilities
 - LNG facilities
 - Gas field operators
 - Gas facility developers
 - Reporting of short-term gas and LNG transactions
 - Some expanded reporting requirements
 - Registration simplification
- GSOO high-level impacts
 - Mandatory surveys
 - New GSOO Market Procedure
 - Inclusion of the Northern Territory
 - Expanded content of GSOO



Western Outer Ring Main (WORM)

WORM

- Project was initially expected prior to winter 2022 (per 2019 VGPR), now targeting completion prior to the end of 2022
- Environment Effects Statement (EES) going through the preparation and review process, then after approval, the approval process for the Pipeline Licence
- Piping and compressor has been ordered, which is expected to arrive in early 2022



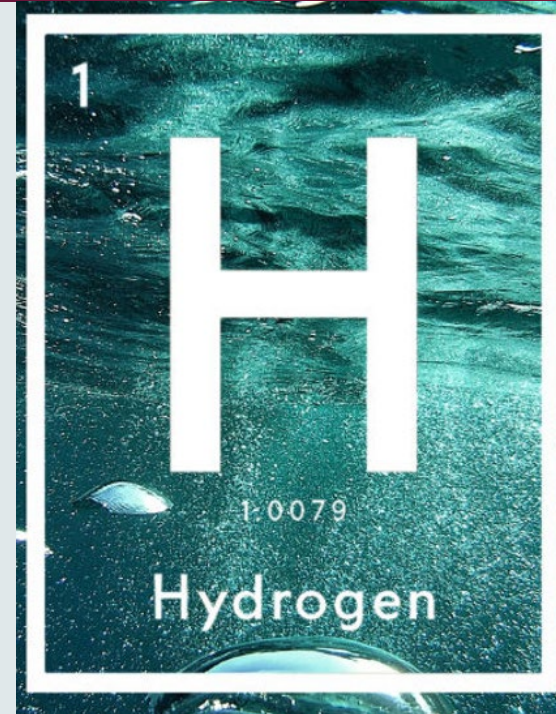
LNG Terminals

- Port Kembla Gas Terminal (PKGT)
 - Modifications to the Eastern Gas Pipeline and VicHub to enable supply into Victoria from the Port Kembla Gas Terminal (PKGT)
- Victorian LNG Terminal
 - Assessing South West Pipeline / Brooklyn Lara Pipeline expansion options to accommodate a possible LNG terminal at Corio or Avalon, both near Geelong



Distributed Gas Resources

- Hydrogen and Biomethane
 - Proposed projects to blend hydrogen and biomethane into distribution networks including AGIG HyP Murray Valley
 - State-wide heating value used in Victorian retail market would result in inaccurate retail metering with a hydrogen blend
 - Presentations to the GWCF and GRCF
 - Project scoping for gas retail metering and allocations systems upgrade, leveraging the capability of the Heating Value Allocation Model system
 - Working with DELWP to develop rule changes and scope changes to regulations and codes



Market Clearing Engine

- DWGM Market Clearing Engine upgrade
 - Replacement of current MCE due to age and supportability
 - Pipeline capacity constraint management challenges due to the WORM
 - Investigation and evaluation of solution approaches



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da = h - i;  
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word: Ds[u].getTime();  
}} "#word-list-out").html(" ");  
var l = w(),  
s = (parseInt(m) - 1) * 1000;
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Thank You

