



सत्यमेव जयते
Ministry of
Agriculture
initiative

Sea-port Gateway for Perishables

Cold-chain: Future Plans STRANDED COLD RECOVERY

India Ports and Shipping Conference

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New Delhi, India



National Centre for Cold-chain Development

राष्ट्रीय कोल्ड-चेन विकास केंद्र

- ❖ The largest producer of milk (140 million tons).
- ❖ Largest producer of mangoes (15 million tons).
- ❖ Largest producer of bananas (29 million tonnes).
- ❖ Largest buffalo livestock (105 million), exporting 2.1 million tons in animal products.
- ❖ Second in fruit (84 million tons) and vegetable production (170 million tons).
- ❖ Third-largest producer of fish (9 million tons).
- ❖ Third largest pharmaceutical producer, 8% of global production.

- ❖ Coastline is more than 7,500 km long.
- ❖ Interspersed with more than 200 ports.
- ❖ International cargo: 95% by volume and 75% by value is carried by sea.
- ❖ Ports capacity 1,247 million tonnes, doubling by 2017.
- ❖ Railways: 87,087 km, across 7,083 stations and operates more than 18,000 trains every day.
- ❖ 4.2 million km Roads : National Highways - 76,818 km, State Highways - 154,522 km, District Roads - 2,577,396 km, Rural Roads - 1,433,577 km.

India

4



🌴 not a single perishables gateway!

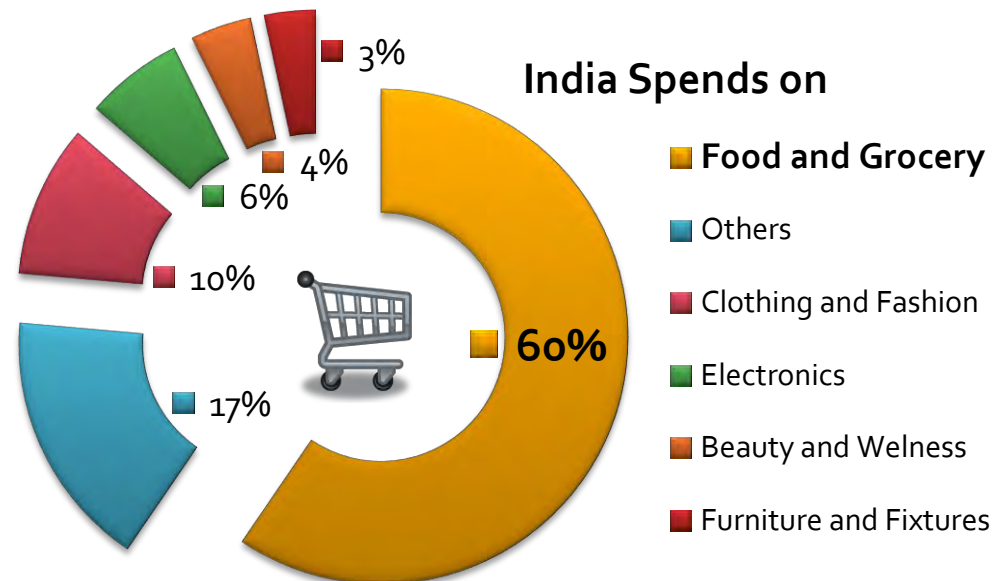
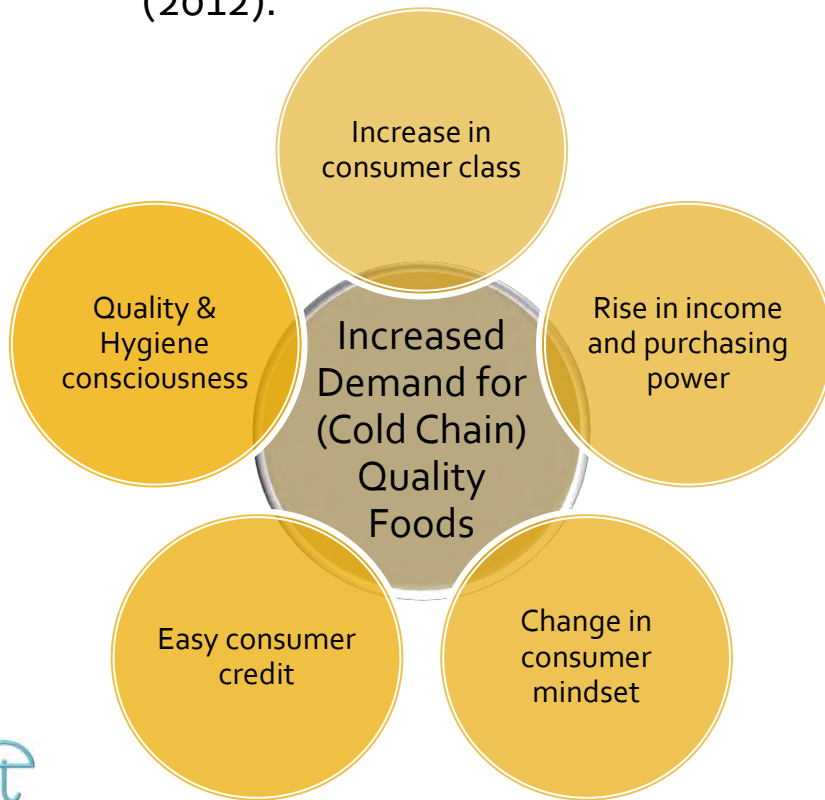
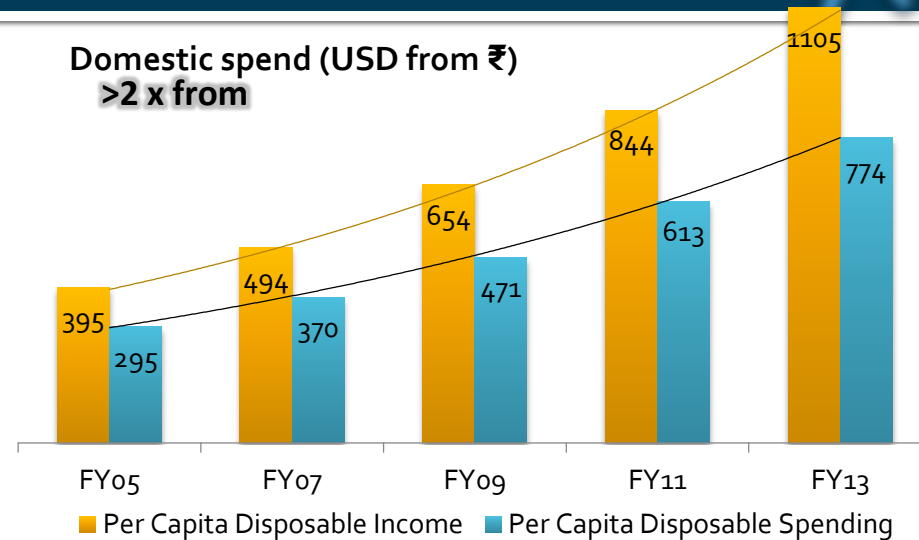
🌴 Containerisation at 20%.

🌴 Ports a bottleneck for perishables.

Consumption Trends

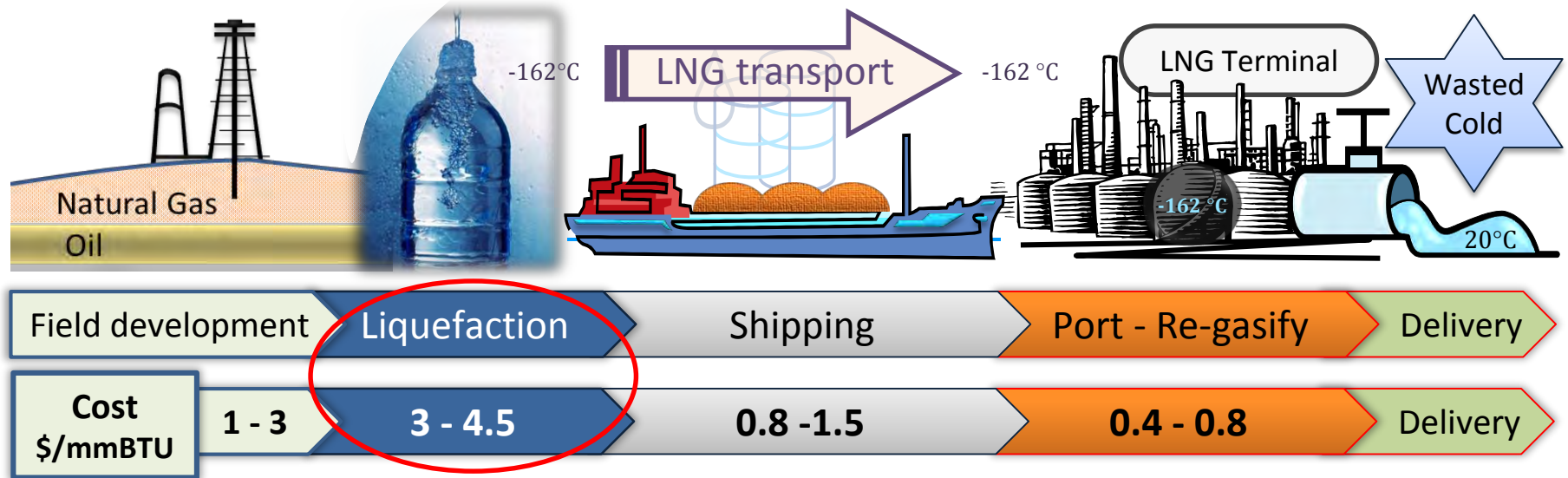
- ❖ GDP USD 1.9 trillion from USD 0.95 trill in 2006 (+100% in 7 years).
- ❖ Spending growth: \$991 billion in 2010 to \$3.6 trillion by 2020 (5.8% of global consumption, doubling from 2.7%).
- ❖ 1,870,000 Consumer Food outlets (2012).

Domestic spend (USD from ₹)
>2 x from



Source: Boston Consulting & CII, IRIS, MoSPI- Govt of India.

About LNG delivery



- ❄ Natural gas is refrigerated to convert into liquid form for purpose of shipping.
- ❄ Volume is reduced, 1 ship needed instead of 600 ships.
- ❄ At receiving port, the LNG undergoes regasification process before supply to consumers.
- ❄ During Regasification energy is shed to environment.

What is Regasification

- ❄️ Regasification is simply, a **reheating process**.
- ❄️ Liquefied gas is boiled off or vaporised for ease and safety of end use handling.
- ❄️ Free source of heat is used - by circulating seawater or blowing atmospheric Air. The transferred cold is discarded, lost back to air.

Almost 500kWh energy/t LNG is used when readying for shipment. Most of this energy can be easily recovered.

- ❄️ Stranded cold is a zero CO₂ emission energy source at each LNG port terminal in India.

Existing LNG Terminals in India

#	LNG Terminal	Location	Operated by	Capacity (mmtpa)
1.	Dahej LNG Terminal	Gujarat	PLL	10 (15*)
2.	Hazira Terminal	Gujarat	Shell and Total	5 (7*)
3.	Petronet LNG at Kochi	Kerala	PLL	5
4.	Dhabhol LNG Terminal	Maharashtra	RGPPL, GAIL & NTPC	5

* Expanding

- ❄ Installed capacity 25 mill metric tons per annum (mmtpa), expanding to 32 mmtpa.
- ❄ Equivalent (stranded cold) energy recovery option of 500-640 Mega watts

Recycling Cold-energy

Generate Electricity via expansion based turbines

- Cold energy Power Generation (cryogenic)

Desalination plants – CryoDesalination

Cryogenic Air separation – medical & other uses

- Dry Ice, CO₂, Nitrogen, Argon, O₂, etc.

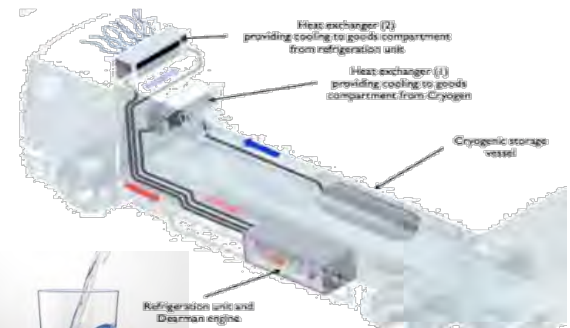
Direct heat transfer for over-the-fence cold port

- Deep Freezing, temp controlled storage – Food processing

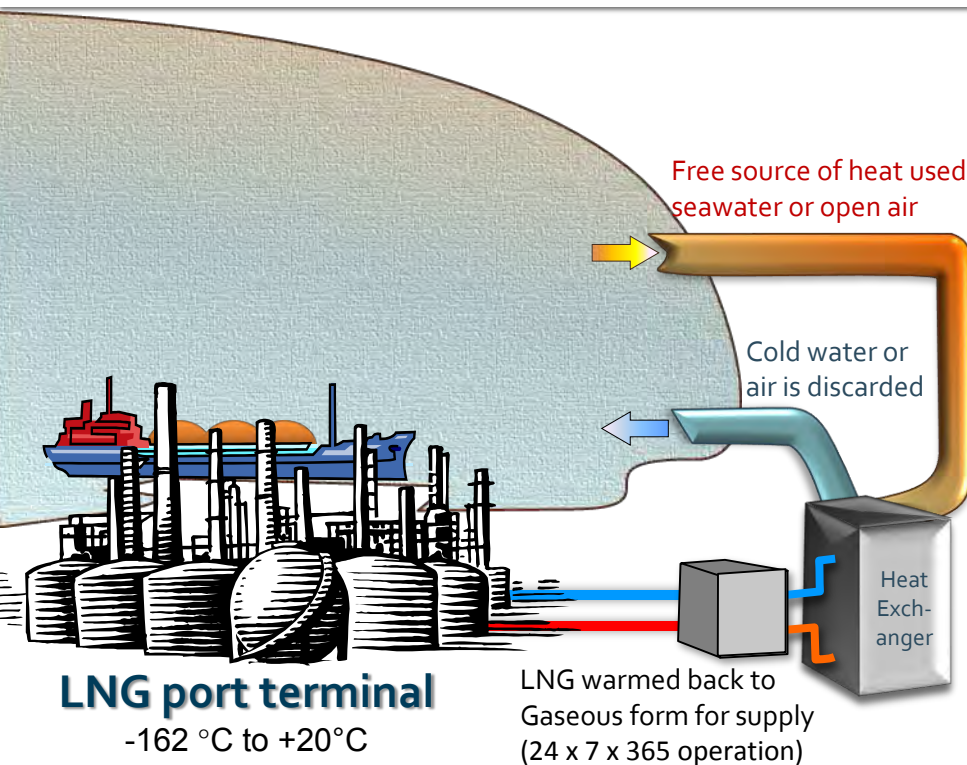
Operate refrigerated trucks, fork lifts on liquid air

- Cryogenic engines, local transport, etc.

Facility air conditioning



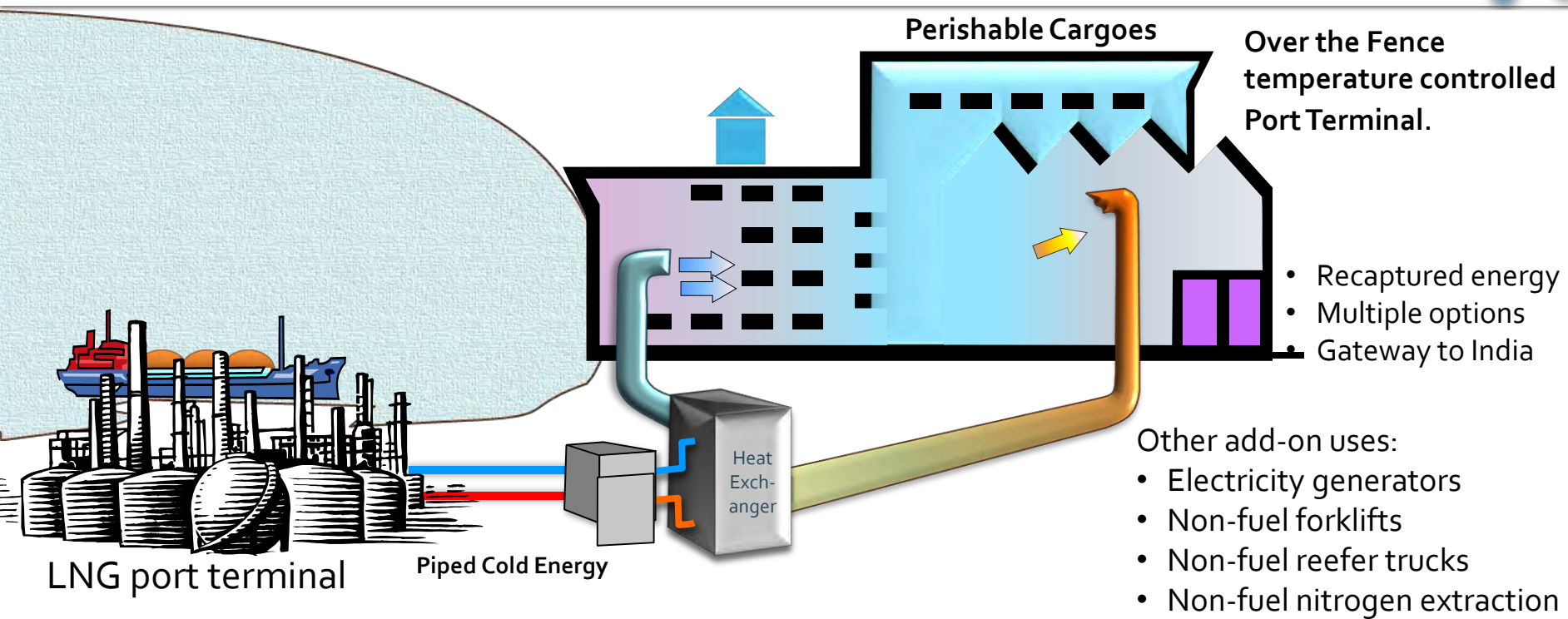
Stranded Cold



- ❄ To regasify the Liquid Gas (kept at -162°C), seawater is used as source of heat.
- ❄ Alternately, open air is circulated by blowers to warm LNG into its natural gaseous state.

- ❄ LNG regasification procedures allow for all the stored cold energy to be discarded.
- ❄ Opportunity to recycle this energy is immense and low cost intervention.

Capturing Stranded Cold

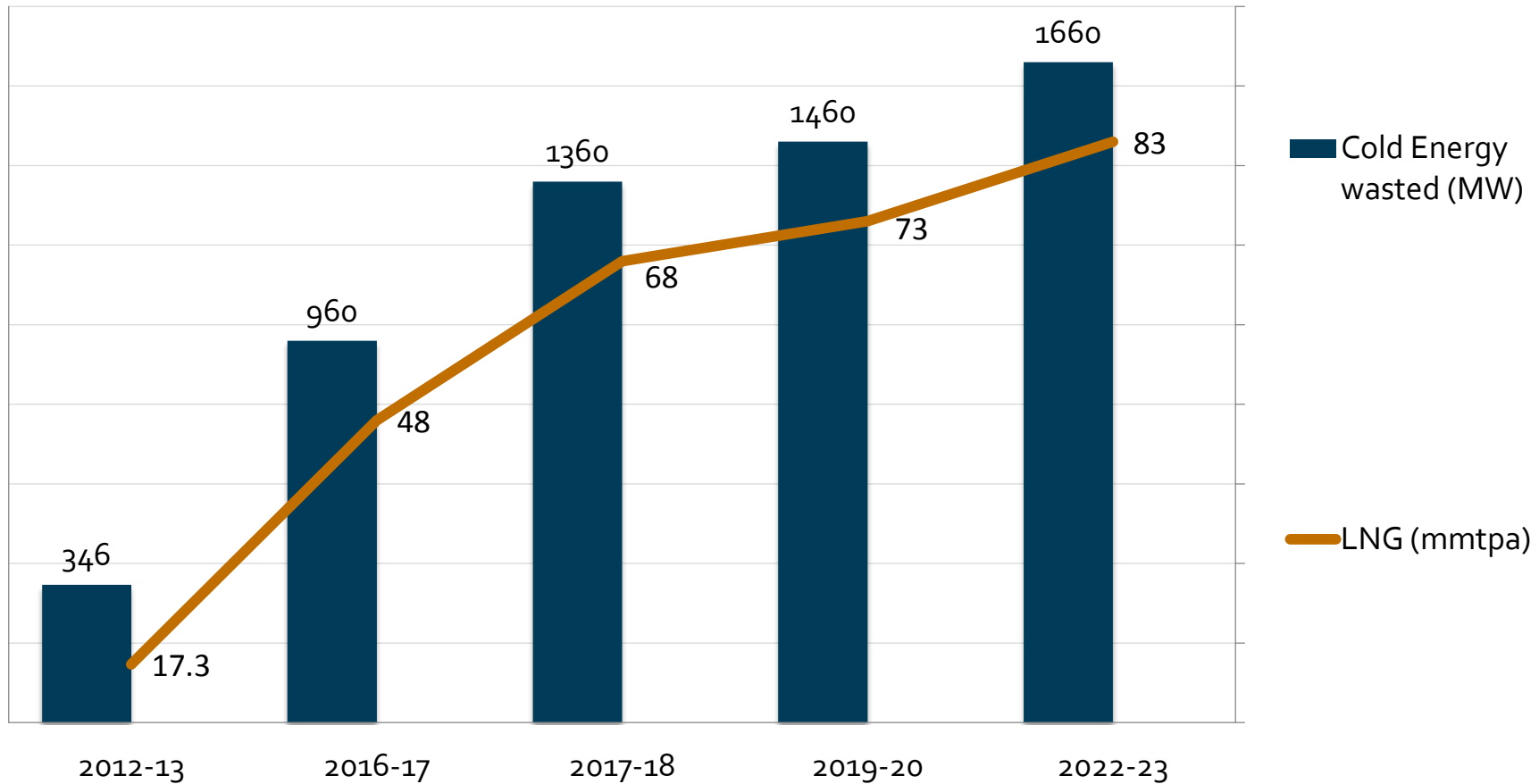


- ❖ Cost of recovering energy minimal, Value extraction maximum
- ❖ Port based Cold hub for entire region.
- ❖ Special Perishables Gateway status
- ❖ Faster Phyto-sanitary clearances, optimising logistics

Create the world's first Zero CO₂ emission Port facility

LNG Regasification & Energy wasted

Waste Energy Recovery from R-LNG (20 MW from every mmtpa regasified)



Integration opportunity with perishables gateway – clean energy, zero cost refrigeration for temperature controlled operations. Spare for other optimisation.

Proposed LNG Terminals in India


#	Name / Location	State	Operators	Capacity (MMTPA)
1	LNG Terminal at Paradip	Odisha	GAIL & Paradip Port Trust	4-4.8
2	LNG Terminal at Dhamra Port	Odisha	IOCL & DPCL	15
3	Mangalore LNG Terminal Ltd	Mangalore	ONGC, Mitsui of Japan & BPCL	2-5
4	Ennore LNG Terminal Ltd	Chennai	IOCL & TIDCO	5-10
5	Mundra LNG Terminal	Gujarat	GSPC & Adani	5-20
6	LNG Terminal at Pipanav	Gujarat	Swan Energy	3
7	LNG Port at Kodinar	Gujarat	Shapoorji Pallonji & HPCL	5
8	LNG Terminal at Okha	Gujarat	L&T and GSPC	5
9	LNG Terminal at Gangavaram	Andhra Pradesh	PLL & GPL	5
10	LNG Terminal at Kakinada	Andhra Pradesh	GAIL, APGIC, Shell	3.5-5
11	Krishna Godavari Terminal at Kakinada	Andhra Pradesh	VGS Group, Cavallo Energy, Exmar	3.6
12	LNG Terminal at Kochi	Karnataka	PLL	2.5
13	LNG Terminal at Haldia	West Bengal	Hiranandani Group	4
14	LNG Terminal at East Midnapore	West Bengal	Hiranandani Group	4
15	LNG Terminal at Digha	West Bengal	HEECPL, a subsidiary of H-Energy	8
16	LNG Terminal at Jaigarh	Maharashtra	H-Energy Gateway Private Limited	10
17	LNG Terminal at Dighi Port	Maharashtra	Hiranandani Group	8
18	LNG Terminal at Sikka	Gujarat	RIL	5



Supported by GoI




Low interest Fund of Rs 5000 crores (WIF)



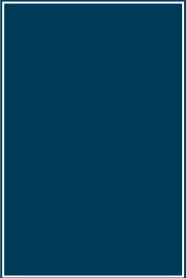
Credit linked subsidy at 35% (*upto 50%*) for cold-chain infrastructure



Investment linked 150% tax deduction



Automatic route for 100% FDI in cold-chain projects, ECB route open



Service Tax exemption: warehousing or transporting of agriculture produce



Access to National Clean Energy Fund



धन्यवाद
Thank You



National Centre for Cold-chain Development

राष्ट्रीय कोल्ड-चेन विकास केंद्र

www.nccd.gov.in

Contact-NCCD@gov.in