An Introduction

National Centre for Cold-chain Development

Autonomous Body to serve as a Think-tank for Cold-chain and Agri-logistics matters.

Operationalised in 2012 by Ministry of Agriculture & Farmers Welfare

National Centre for Cold-chain Development
राष्ट्रीय कोल्ड-चेन विकास केंद्र

About NCCD

- Autonomous body of the Government of India
- Objective to facilitate cold chain development
- Impacts across all user segments
- Guides cold-chain policy matters
- Intervenes in capacity building
- Recommends standards

Sanctioned by Cabinet to function as autonomous body for cold-chain development.
Provided one time grant as corpus, no recurring funding.

Vision NCCD: Stakeholder Think tank

Pioneer Excellence in the development of Cold-chain in India

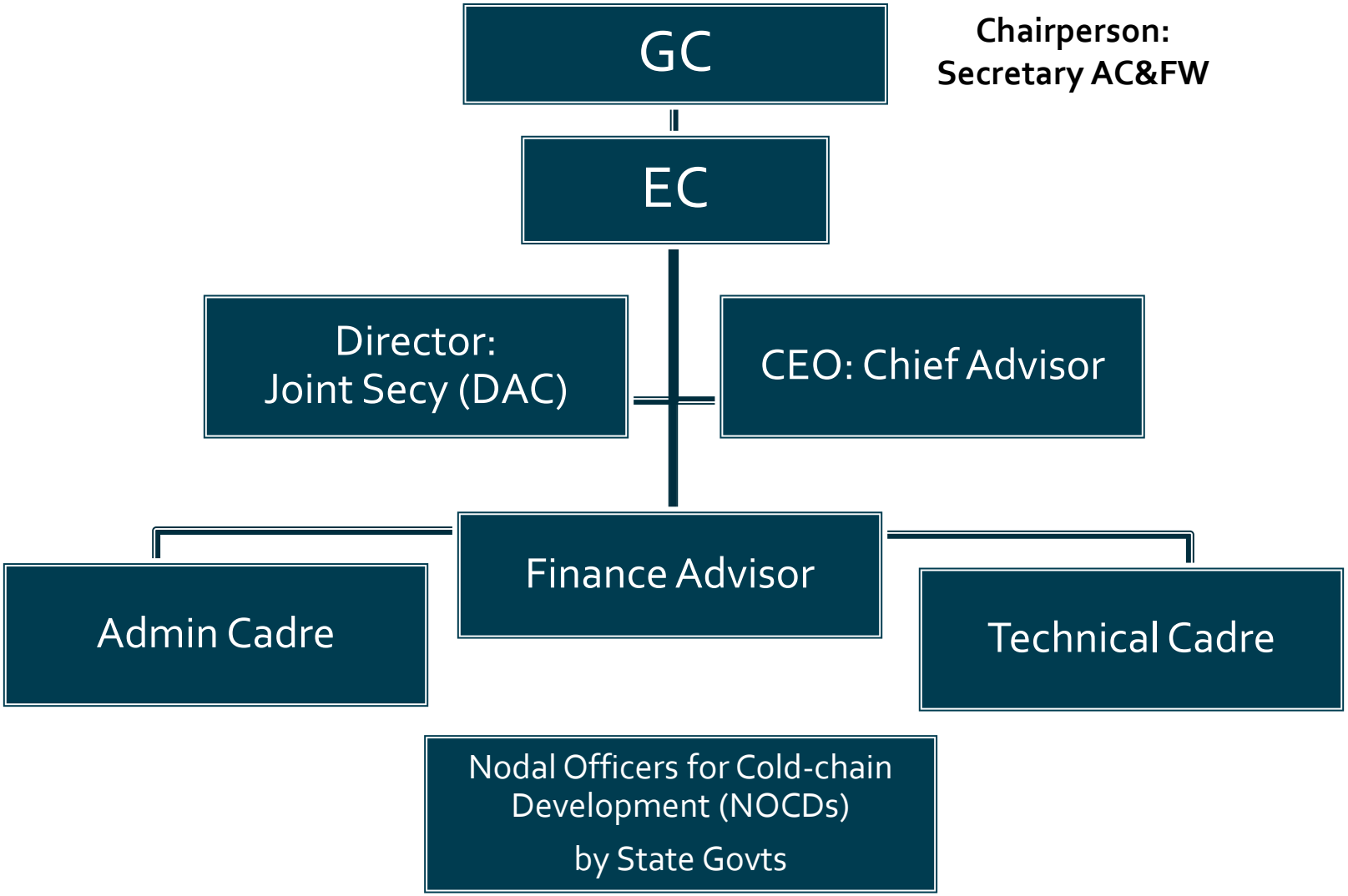
Take the Lead Role in promoting innovations in cold-chain development

Enable an environment to bring experienced participation in operations & investments

Function in PPP mode, distanced from direct government involvement on day to day basis

- Cold-chain justifies productivity, adds to socio-economic growth and environmental sustainability.
- Cold-chain, as a physical conduit, is the intervention that empowers the producers to overcome perishability and to link across distance with multiple markets.

Organisation Chart



Industry Participation

Category G	• Groups (Grower Associations, Cooperatives, FPOs, NPOs, Students, etc)
Category C	• All Companies, Investors and Researchers.
Category I	• Industry Bodies (Associations / Chambers), PSUs & Apex Institutes.
Category P	• Patron Members.
Category R	• Resource Institutes: Educational Centres of Excellence, Regulatory Authorities.
Category A	• Associate Member (Individuals).
Category F	• Fellow of NCCD.

Collaboration & Capacity Building

- 19 States have nominated NOCDs (Nodal Officers for Cold-chain Development)
- Capacity building for Government & Private industry
  - 3 day Residential Training program at Chennai on advanced technologies, energy efficiency.
  - 5 day course at Cemafroid on cold-chain.
    - Co-funded by Govt of France

Pioneering Excellence

- Entrepreneur & skill building – ripening units
  - Pan-India through members of NCCD
  - 4379 trainees, district level participation
- Student chapter, academic institutes
- Professional stakeholders









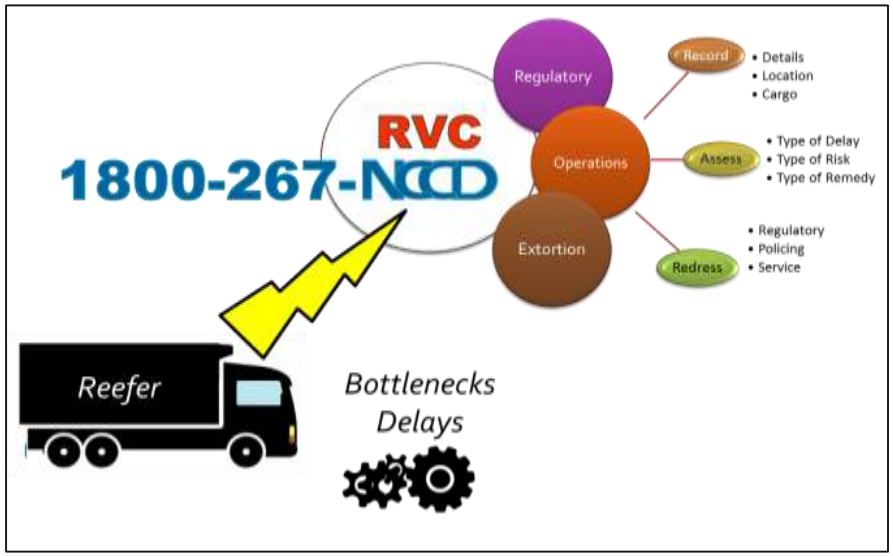

Reefer Vehicle Call-in-centre

Vision

Reduce cost of Food Delivery across India.

How

- Promote Stakeholder participation in remedial measures.
- Fast track the movement of perishable cargoes.
- Reduce Risk to Inventory in-transit
- Provide technical viability to surface distribution of perishables.
- Improve monitoring & governance of perishable movement.



- **The first 'Bhagidaari' (inclusive) e-governance intervention in cold-chain.**

Pilots, Systems, Standards

- Developed Guidelines & Minimum System Standards
- Malda Mango to Delhi
  - 24 tons: 1500 kms, weekly
- BEE-Cool, a bee migration unit
  - Refurbished truck body with cooling
  - Racks to transport bee hives
- ICAP for harmonising data (NeGP)
- North South off-season connectivity

- Definitions and concepts
- Round tables, IC & JWGs
- State Action Plans

Knowledge sharing

Newsletters

- International Journal on cold-chain management planned

Information & bulletins

Information Bulletin

(Ministry of Agriculture)

"Centrally Sponsored Scheme for Cold-chain Projects"

Ministry of Agriculture

Cold-chain logistics is a thrust area for development, and considered as part of the second green revolution. Cold-chain is viewed as an end-to-end logistics bridge, providing uninterrupted custody of value harvested at farm-gate to the end-consumers. The Government of India supports the development of cold-chain and through the Mission on Integrated Development of Horticulture of the Ministry of Agriculture provides several incentives to interested participants. Financial assistance of 35% to 50% of admissible cost is granted.

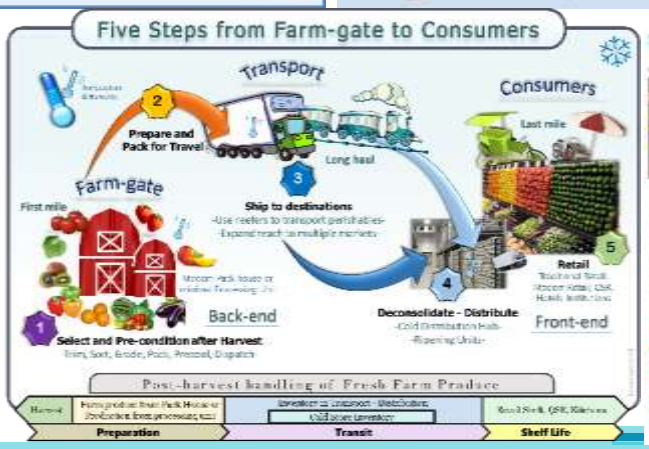
Who can apply: **Private Industry, Entrepreneurs, Cooperatives, Farmer groups, PSUs.**
When to apply: **Scheme is demand driven and can be availed all through the year.**
Where to apply: **Offices of local Horticulture Mission or National Horticulture Board.**
Eligible Components: **Modern Pack-houses with Pre-coolers, Cold Rooms, Cold Stores, Reefer Vehicles, Reefer Containers, Ripening Units, Alternate Energy, Retail shelves, Vending carts.**

Requirements: Fully funded project with loan sanctioned from a nationalised Bank. Subsidy is credit linked to incentivise owners by reducing their credit burden. Supported components are explained in the scheme Guidelines, should abide minimum System Standards. You can create market links & reduce Food Losses!

Guidelines & Standards: See www.MIDH.gov.in or www.NCCD.gov.in | *For more information*: Contact the closest State Horticulture Department or your State's Nodal Officer for Cold-chain Development (NOCD).

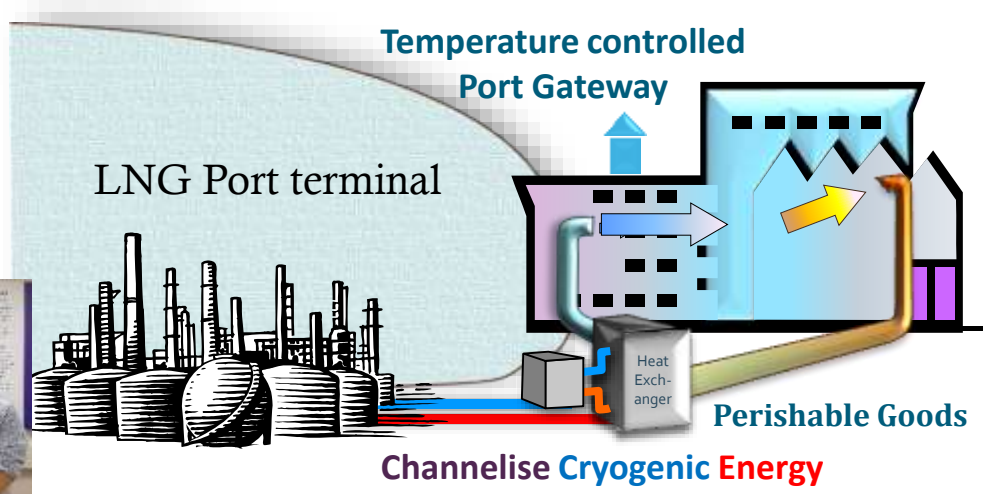
Benefits of investing in Cold-chain

- Investment Linked 150% Tax Deduction (Section 35-AD of IT Act) -
- Low interest loan from Warehousing Infrastructure Fund (NABARD) -
- Credit linked Subsidy to projects @ 35% to 50% of admissible costs (MIDH) -
- Service Tax exemption for preconditioning, storing, transporting agricultural produce -
- Service Tax exempted for 'Erection, Commissioning, Installation' of Cold storage & transport -
- Rewards of endless Demand, Smart bridge between rural & urban, reduced Food loss -
- Growing market for Fresh Fruits and Vegetables, domestic and international -
- Option to avail of Negotiable Warehousing Receipts as per WDRA norms -
- 100% FDI through automatic approval route, and ECB route open -



Recognitions

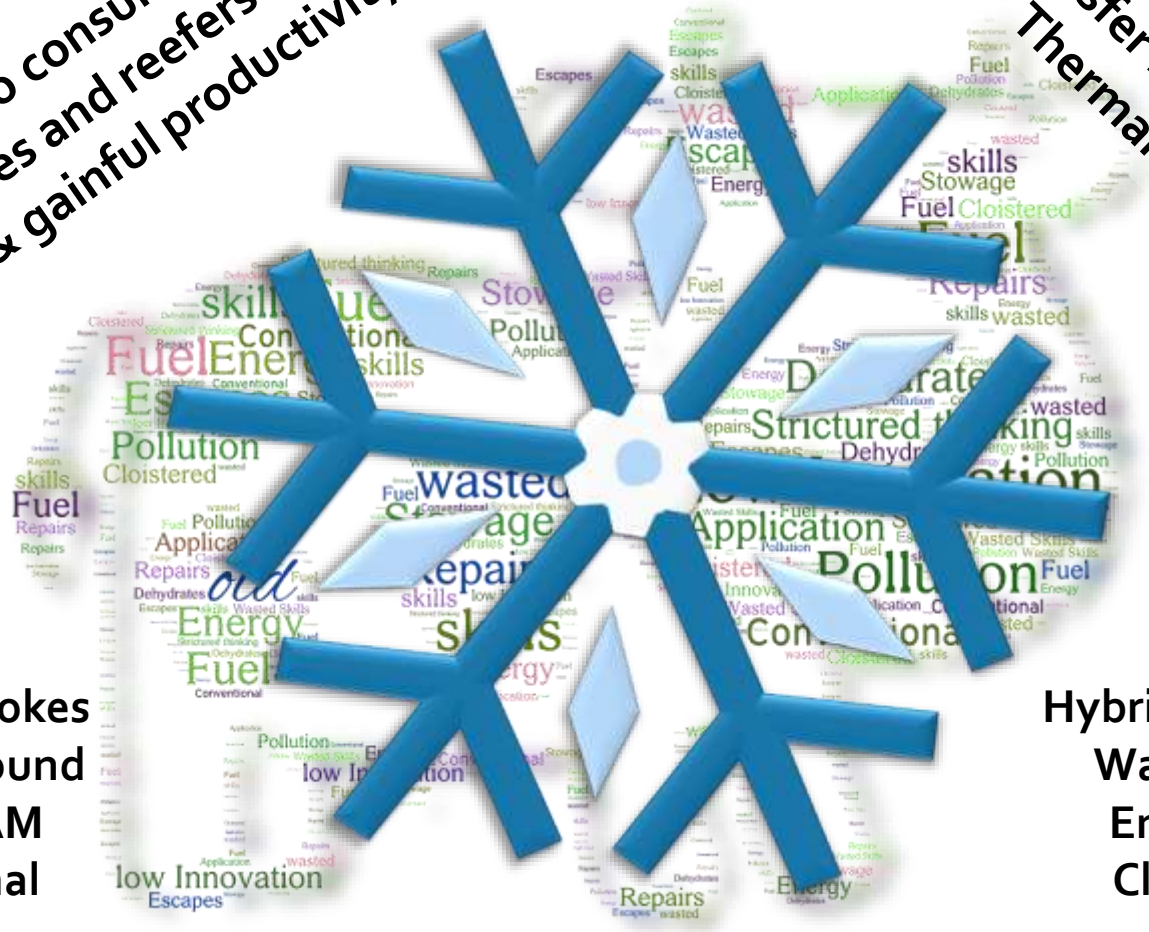
- New Concepts - Waste (stranded cold) energy recovery from LNG regasification, port gateways.
- APO session recommends an NCCD in every SE Asian nation (2013).
- Recognised with first Agribusiness Leadership Award (2014).
- Invited to debate on Food Crisis at UK House of Lords (2015).
- Expert witness to UK Policy Commission on cold economy (2015).
- Chair on Food Loss and Waste at Global Summit in Hague (2015).
- Certified as General Public Utility u/s 12AA of the IT Act (2015).
- Study with inverse approach, linking consumption to cold-chain (2015).
- NCCD exempted from service tax, in Union Budget (2016).



Disruptive *THINKING!*

Farm-gate to consumer
Pack-houses and reefers
Safe ripening & gainful productivity

Transfer heat, not generate heat
Thermal Banks to reutilise



Different strokes
Magnets, Sound
Peltier, VAM
Geothermal

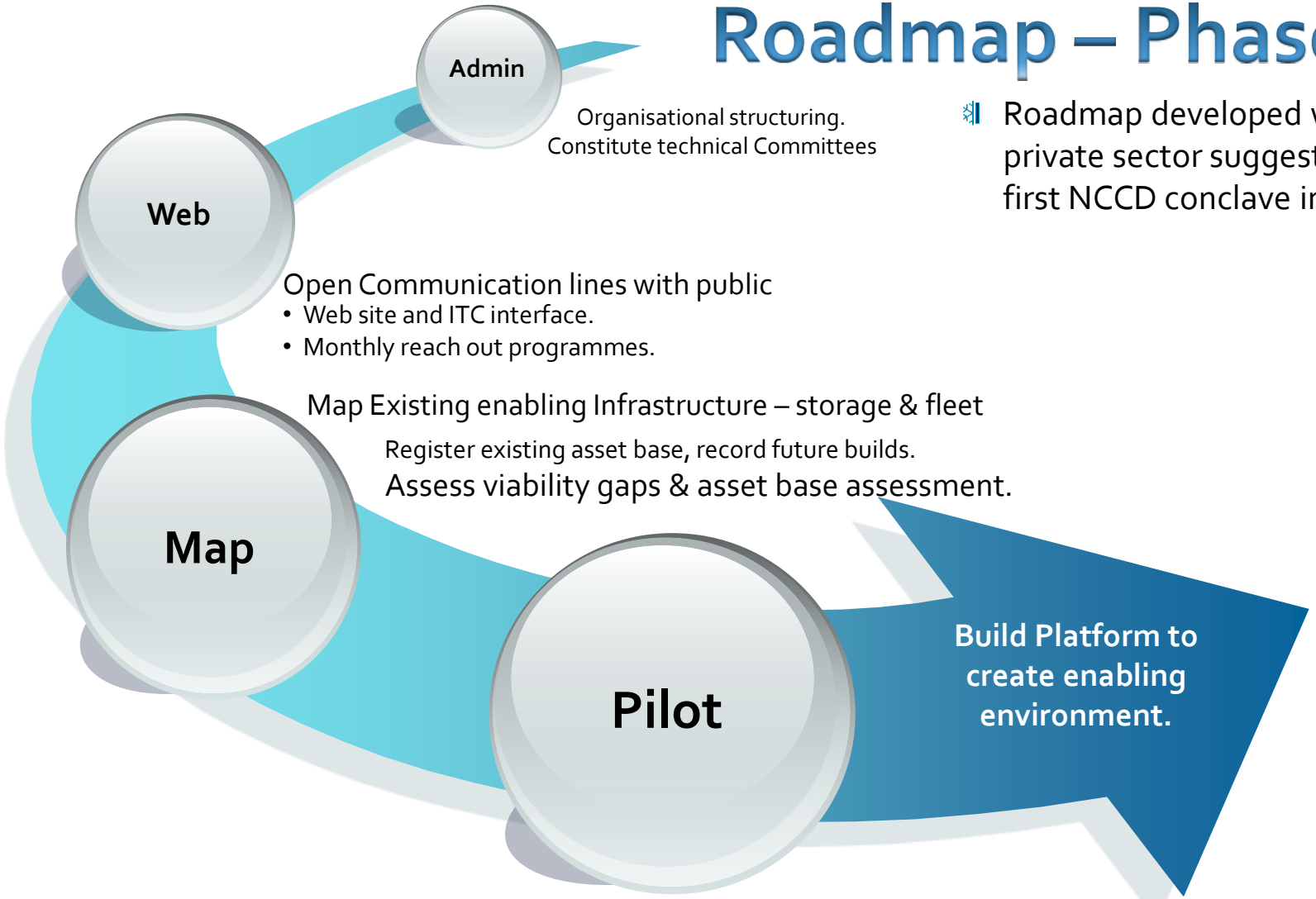
Hybridised solutions
Waste recovery
Energy reuses
Clean options

"We've got the fuel. We've got the technology… It's what's in between that's the challenge."

Roadmap NCCD

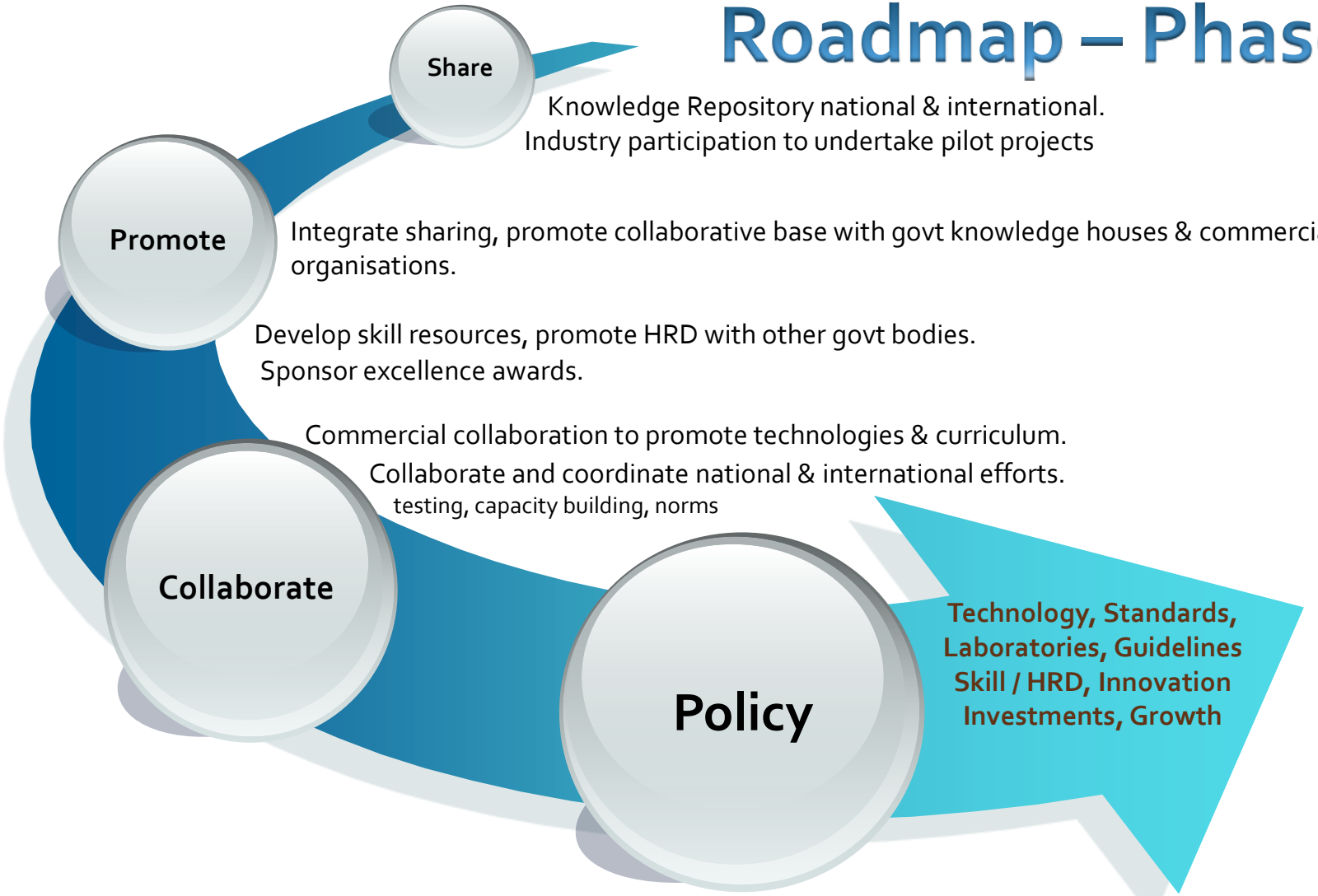
Roadmap – Phase I

- Roadmap developed with private sector suggestions at first NCCD conclave in 2012.



Roadmap NCCD

Roadmap – Phase II



Added Mandate

Additionally NCCD was assigned as NLA of MIDH:

- First Action Plan as NLA in 2013-14 (Nov-2013)

- Mandate: as National Level Agency of MIDH
  - To update technical standards and adherence protocols as necessary when improved technologies & efficiencies are introduced/understood/approved.
  - Guide policy and standards for development of integrated cold-chain in the country, for perishable fruits, vegetables and other allied agricultural commodities to link with markets.
- MoU on knowledge sharing with Cemafroid of France (as part of Indo-France JWG) – organization similar to NCCD since 1956.
- Represent India at 'Institut International du Froid' - independent intergovernmental science and technology based body (from 1908) to promote knowledge in all fields of refrigeration. Addresses key issues that include food safety, health, energy saving and energy efficiency, global warming and ozone depletion.

Key Interventions by NCCD

- **All India Cold Storage Survey** *Implemented by NHB*
  - Capacity created = 32.95 mMT (*6586 nos*)

    (*survey data upto June 2014*)
  - Closed permanently = 1219 nos

    (*includes 254 units not located on site*)
  - Operating Capacity = 26.85 mMT (*5367 nos*)
- **Demand Driven Study** *Implemented by NCCD*
  - Inverse approach to infrastructure requirement
- **Guiding Rationalising of support programs**
  - System Standards for cold-chain infrastructure.

PPP for Knowledge Capacity

- Think tank to Govt on the subject of cold-chain and agribusiness. Engage with its members to translate industry needs into policy recommendation.
- Manned by technocrats (industry leaders) and functions through member stakeholder consultation.
- Provides an enabling environment and facilitates private investment in cold-chain sector.
- Assist in developing and promoting future ready, energy efficient technologies and its adaption.
- Capacity building and training activities to reduce the gap in skilled human resources.
- Awareness on best practices, indigenised for specific requirements and conditions.
- Revisit & guide policies, approve new technologies, efficiencies when developed/understood.
- Research and Monitor impact of policies and recommend any changes, if needed.

Design assistance patterns, Capacity building, Institutional Workshops and Conclaves, Field Studies, Appraisals, Redressals, Policy guidance.

Stakeholder Members:

Groups (Self Help Associations)

- Farmer Groups, Consumer Groups, Cooperatives, students

Resource (Academic Institutes)

- Research, Academic &Training centres

Associates (Individuals)

- Individual associate members

Bodies (Industry or Government)

- Industry Chambers, PSU, Apex Bodies

Company (Commercial)

- Food sector, equipment sector, Investors, Consultants, Logistics, etc.

Fellow (Individuals)

- Senior Individuals as Fellows of NCCD

Thank You

End Deck-1

Deck-2

“All India Cold-chain Infrastructure Capacity” study

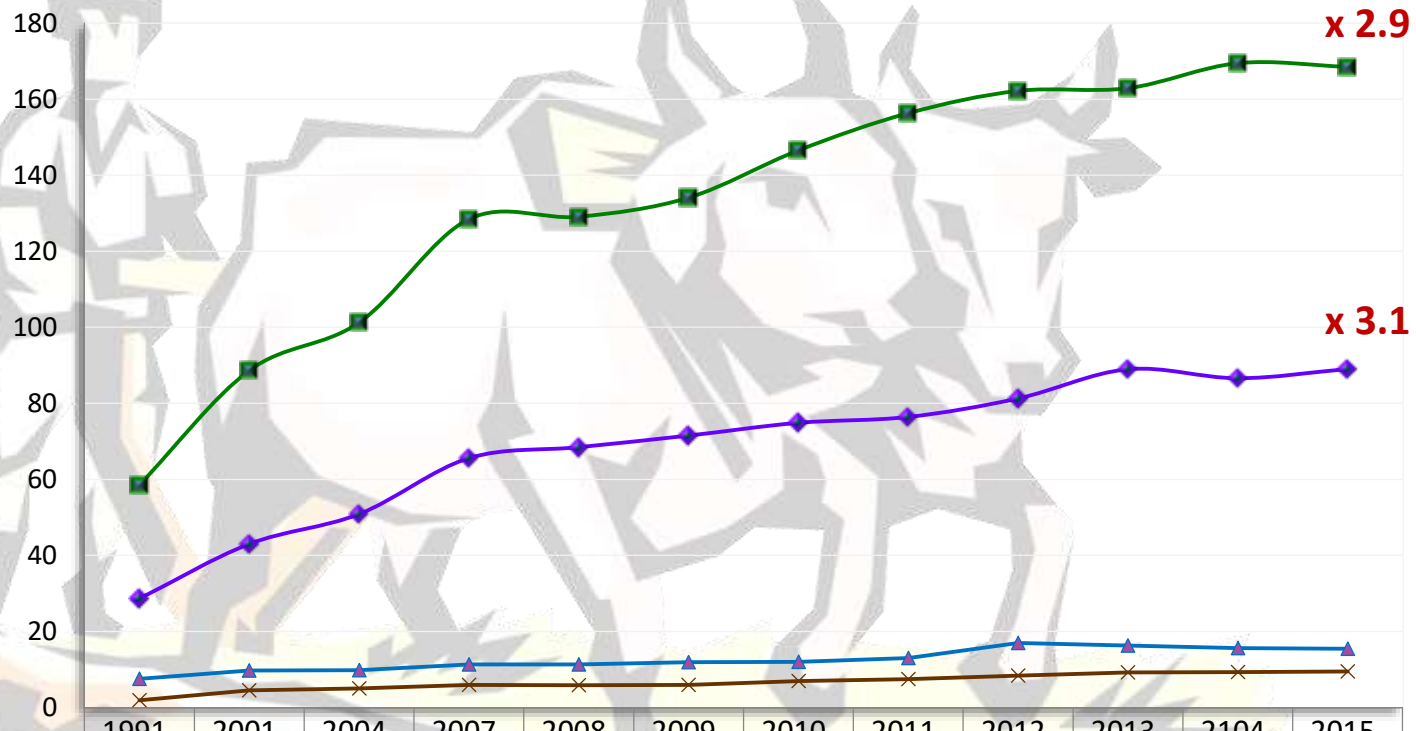
… follows Intermission – the need for a study

Horticulture Trends

- 23 million hectares (off 16% of arable land)
- Contributes 38% to Gross Net Value of Agriculture

Horticulture Production

Million Metric Tons



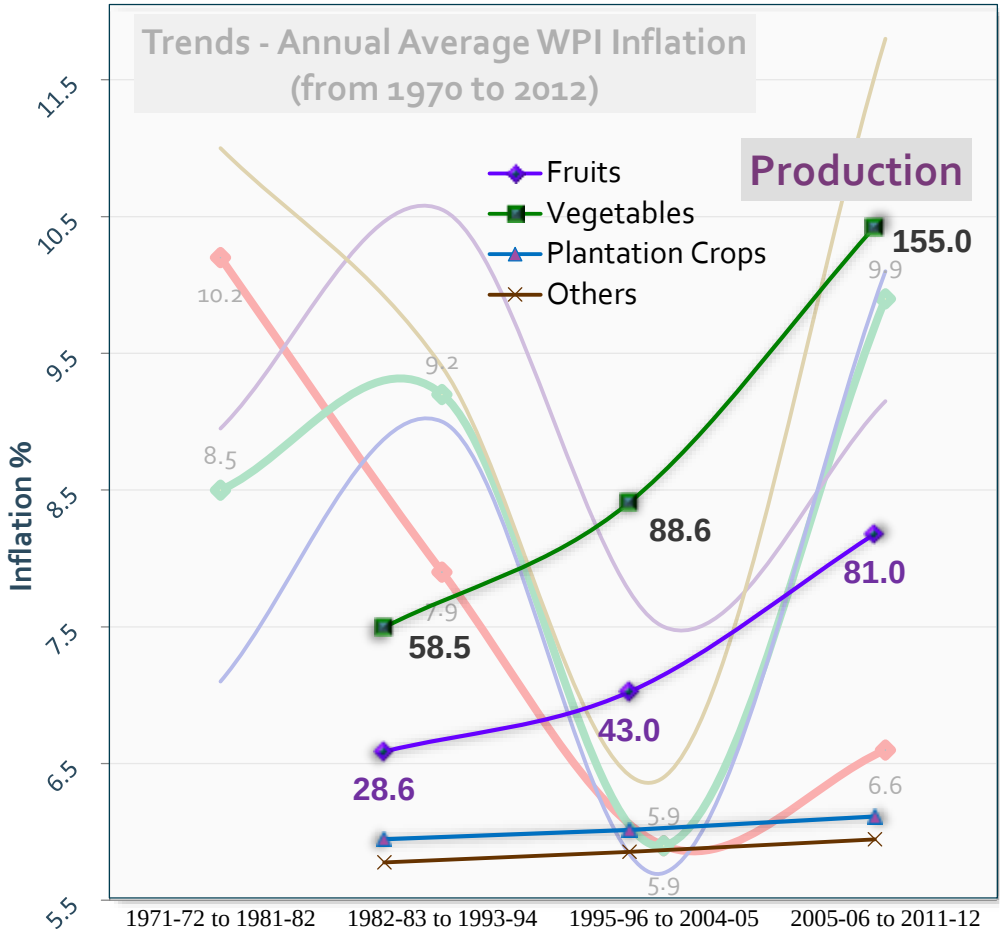
	1991-92	2001-02	2004-05	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2104-15	2015-16e
Fruits	28.632	43.001	50.867	65.587	68.465	71.516	74.878	76.424	81.285	88.977	86.602	89.018
Vegetables	58.532	88.622	101.25	128.45	129.08	134.1	146.55	156.33	162.19	162.9	169.48	168.51
Plantation Crops	7.498	9.697	9.835	11.3	11.336	11.947	12.007	12.993	16.984	16.301	15.575	15.48
Others	1.9	4.464	4.985	5.9	5.837	5.908	6.986	7.414	8.39	9.177	9.331	9.484

Others: includes Spices, Loose Flowers, Nuts, Mushroom, Aromatic/medicinal and Honey .
Source: Horticulture Division, Ministry of Agriculture and Analysis

Inflation Trends

WPI Inflation trends (40 years):

- Despite **producers** showing **robust response** by increasing supply, **yet inflationary pressure exists.**
- Food, is now the prime driver with perishables contributing highest.
- This may indicate that demand for perishable products continues to outstrip supply.
- Actually, a **lack of efficient supply systems indicated -** continues to feed inflation in food items.



	1971-72 to 1981-82	1982-83 to 1993-94	1995-96 to 2004-05	2005-06 to 2011-12
All Commodity	10.2	7.9	5.9	6.6
Primary Food	8.5	9.2	5.9	9.9
F & V	9.0	10.6	7.5	9.2
Milk	7.1	9.0	5.7	10.1
Eggs, Meat, Fish	11.0	9.4	6.4	11.8

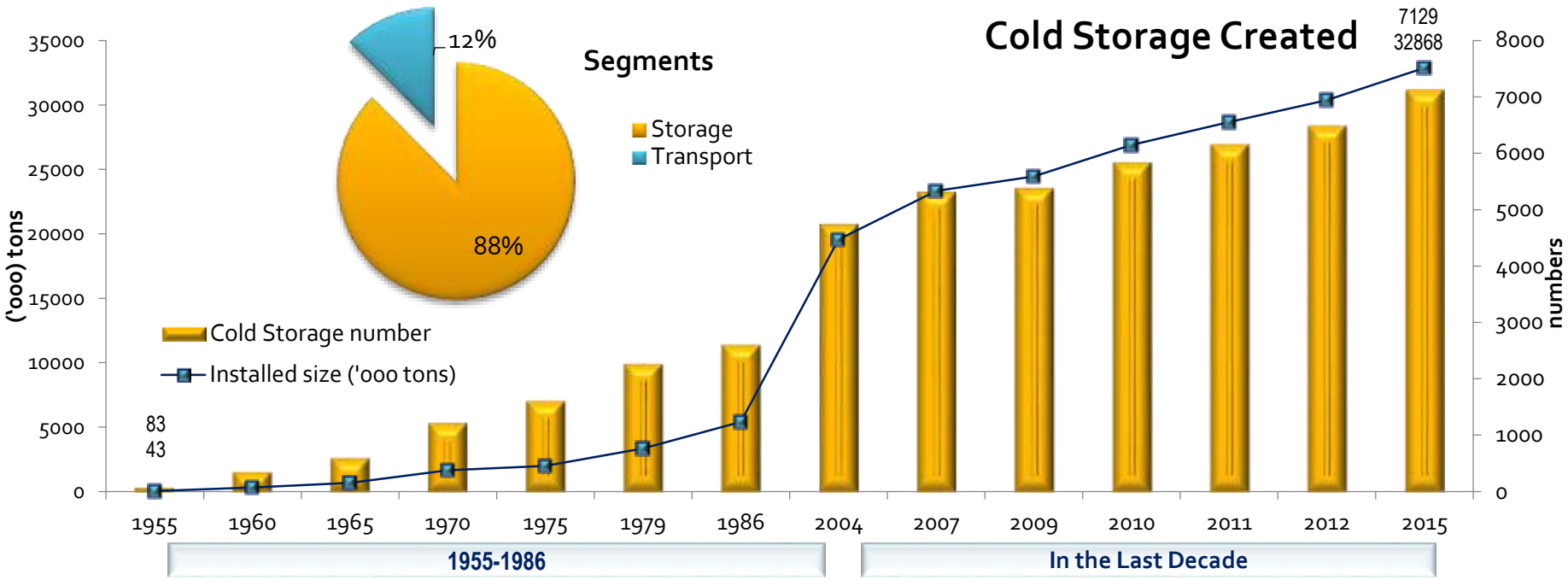
Continual demand for food distribution and cold chain is foreseen over coming decades.

Source: RBI, Office of Economic Adviser, MoCI, Govt of India

Cold-chain: recent reports

- Commodity trading, collateral manager
- Broad based Industry Chambers
- Refrigeration Equipment Providers
- Govt Relation Managers & Knowledge Bankers
- Similar reports put forth by CII, FICCI PHDCCI, EXIM Bank, Consultants and many others… accepted by decision makers*!*

Infrastructure Status



- Incomplete solution: all previous efforts were focused on cold storage requirement.
- The other components necessary for handling fruits and vegetables were not considered – such as Modern Pack-houses and transport requirements for fresh produce.
- As a result, major Infrastructure created in form of refrigerated Storage, which did not bring impetus to better post-harvest handling of fresh produce, but helped develop marketing of certain processed foods and fresh imports coming in cold-chain.

Need to Identify Missing Links

- **World's largest footprint in cold stores**
  - 134 million mtrs^3 in refrigerated storage (33 mill tons)
    - USA has 115 and China 70 million cub. metres of refrigerated space.
- **Food loss remained high in the supply chain**
  - FAO HLPE of 2014 reported 126 kg FLW per capita per annum
  - Industry reports indicated 30-40% production lost
- **Urbanisation high, population keen for high value foods**
  - Imports of fresh produce grew 15 to 30 times in 10 years
  - Market grows for health conscious viz price conscious
- **Farmers socio-economic growth partial**
  - Production levels high, productivity going waste
  - Farmers market access and range limited

Other Counsels

Feb 1999 (Report)	JNL Srivastava Committee reported on Cold Storage – assessed a gap of 39 lakh tons and existing capacity of 103 lakh tons (3443 cold stores). Recommended central support for developing cold stores.
May 2012 (Report)	Dr. S. Chaudhuri Committee reported that push to build cold storage in fruits and vegetables was not successful due to large deficiencies in the logistics system in between the farm to the final consumer.
Sept 2012 (NCCD-CSCL)	NCCD Committee on Supply Chain and Logistics recommended baseline survey of infrastructure to assess usable components across segments, and as a precursor to a need based evaluation.
May 2013 (National Horticulture Conference)	NCCD reported that pack-house and transport are key missing links and that future cold-chain development should holistically address the total activity chain, especially at farm-gate.
April 2014 (MIDH launch)	CCEA approved new guidelines and norms, rationalised to address all relevant links in cold-chain, designed to develop and strengthen supply chain oriented, cold-chain logistics.
May 2014 (NOCD Conclave)	All States advised that physical storage capacity should not be the sole measure of development and to focus on enabling throughput to markets so as to enhance revenue options for farmers.

Key Direction

- Task Force on Cold-chain Projects, MoFPI (TFCP) 2014
  - TFCP stated that NSEL 2010 report "**was not aligned with infrastructure needs of a market linked supply chain**".
  - TFCP reported that "**it emerged that the gap of cold storage capacity earlier assessed at 29 million tons, may not be required**".
  - TFCP proposed that, in view of consensus, for time being additional capacity of 7.5 million tonnes should be aimed over next five years.
  - It is understood, that this capacity does not solely refer to cold stores but includes other critical links so as to achieve end-to-end connectivity from farm-gate to consumer through cold-chain.
- After considering the report by TFCP, the direction after PMO meeting (13-Dec-2014)
  - "cold chain management should be considered as part of the second green revolution and the implementing agencies (NHB, NHM & MOPFI) **should change their approach** and **address it "end-to-end" connecting farm gate to consumer in a seamless manner**."
  - In this background, a commitment to create 2.5 mill tons of cold-chain capacity by each of 3 implementing agencies (NHM, NHB, MOFPI) in next 3 years was made by then Secy MoFPI.

Deck-2: All India Cold-chain Infrastructure Capacity

Status & Gap Assessment (2015)

AICIC (2015) study was commissioned by DACFW and executed through NCCD and NABCONS (Nabard Consultancy).

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Time lines

Date	Remarks
23-05-2014	NCCD proposed market linked assessment of cold-chain infrastructure
15-09-2014	1st meeting of TFCP, informed of study under process
31-10-2014	**Awarded study to NABCONS, after approval of Secy (DACFW)**
09-06-2015	EC of NCCD updated on draft report from NABCONS. EC directed to expedite and release in public domain within one month
11-06-2015	**Draft report forwarded to MoFPI, DAC, NHB, APEDA, ICAR with request to arrange comments and suggestions before 26-06-2015**
24-06-2014	All State Nodal Officers sent summary of draft report
30-06-2015	Reminders sent to provide comments, if any, before 6-7-2015
28-07-2015	MoFPI (and GoI agencies) provided revised table (with cold store capacity reduced basis inputs from DAC) for finalising.
30-07-2015	**First comments from MoFPI, stating requirement is under-estimated.**
31-07-2015	MoFPI comments forwarded to NABCONs for consideration. Tentative explanation provided by NCCD vide email on 03-08-2015
05-08-2015	Meeting held with JS-MoFPI & NABCONs to clarify upon the findings.

Time lines ...cont'd

Date	Remarks
12-08-2015	Letter from Secy (MoFPI) confirming that earlier observations were clarified & directed that the final document suitably reflect the scope of the study. Meeting with Secy was held on 14-08, earlier edition discarded, and edition dated 14-08-2015 finalised for print and release
03-09-2015	**The Study report accepted and released into public domain**

-In following 6 months-

Study shared with all State Govts. for follow-up for developing their action plans for 2016-17.

PHD and CII have held special conferences and sessions to highlight the findings and concept.

Report asked for placing in library of 7 institutes. Amity Univ recommends study as compulsory reading for UG/PG students and researchers .

08.10.2015	Letter from MoFPI to Niti Aayog, with comments suggesting that the capacity requirement and gaps are grossly underestimated
12.10.2015	Point wise response given amplifying on the realistic evaluations.

Approach

- **Demand Driven Study** (*consumption linked*)

Study executed with NABCONS support

- Infrastructure studied as a tool to deliver food.
- Domain specific segmentation of components.
- Requirements assessed for purpose of connectivity.
- Logistics chain evaluated, working backwards from consumption – an Inverse approach.

…Gainful Productivity the target…
Income security for farmers as the outcome

Focus on reducing Loss in the farm-to-consumer supply chain
Infrastructure assessment on realistic consumption patterns, not notional needs
TOR finalized with GoI implementing agencies

Food Loss

When harvested produce escapes its end use *!*

How does our food escape *?*

- By perishing before it can reach gainful use *!*
- Because markets are too inaccessible *!*

Why are markets inaccessible *?*

- Because food is perishable and needs post-harvest care *!*
- Because Post-harvest care is not market linked *!*
- Because such Care requires working tools *!*
- Because such Tools require skills to use *!*
- Because some stakeholders do not care *!*

Strategic direction

OBJECTIVE

Reduce Loss incurred on perishable produce

WHY

Improve value realisation, **Income security to farmers**	Optimise the Nation's **Resource Utilisation**	Give producers & consumers **Stabilised Prices**

HOW

Maximise the reach of produce to markets	**Supply chain technology as an intervention**	**Optimise would-be-waste from perishables**

The AICIC (2015) findings provide direction for developing cold-chains that are linked to consumption, aimed at "seamless farm to consumer" logistics.

Primary Products & Cities

Primary Products

Category (Temp. Range)	Produce/ Products Considered	
Chill (0^0C to 10^0C)	1. Apple 2. Grapes 3. Orange 4. Strawberry 5. Kiwi 6. Potato	7. Tomato 8. Cauliflower 9. Okra 10. Carrot 11. Cabbage
Mild-Chill (10^0C to 20^0C)	12. Mango 13. Banana	14. Papaya
Frozen (below -18^0C)	15. Processed Products 16. Meats (Livestock, Dairy, Fish) 17. Ice-Cream	
Normal (20^oC to 30^oC)	18. Onion Other processed items	

Sample Cities

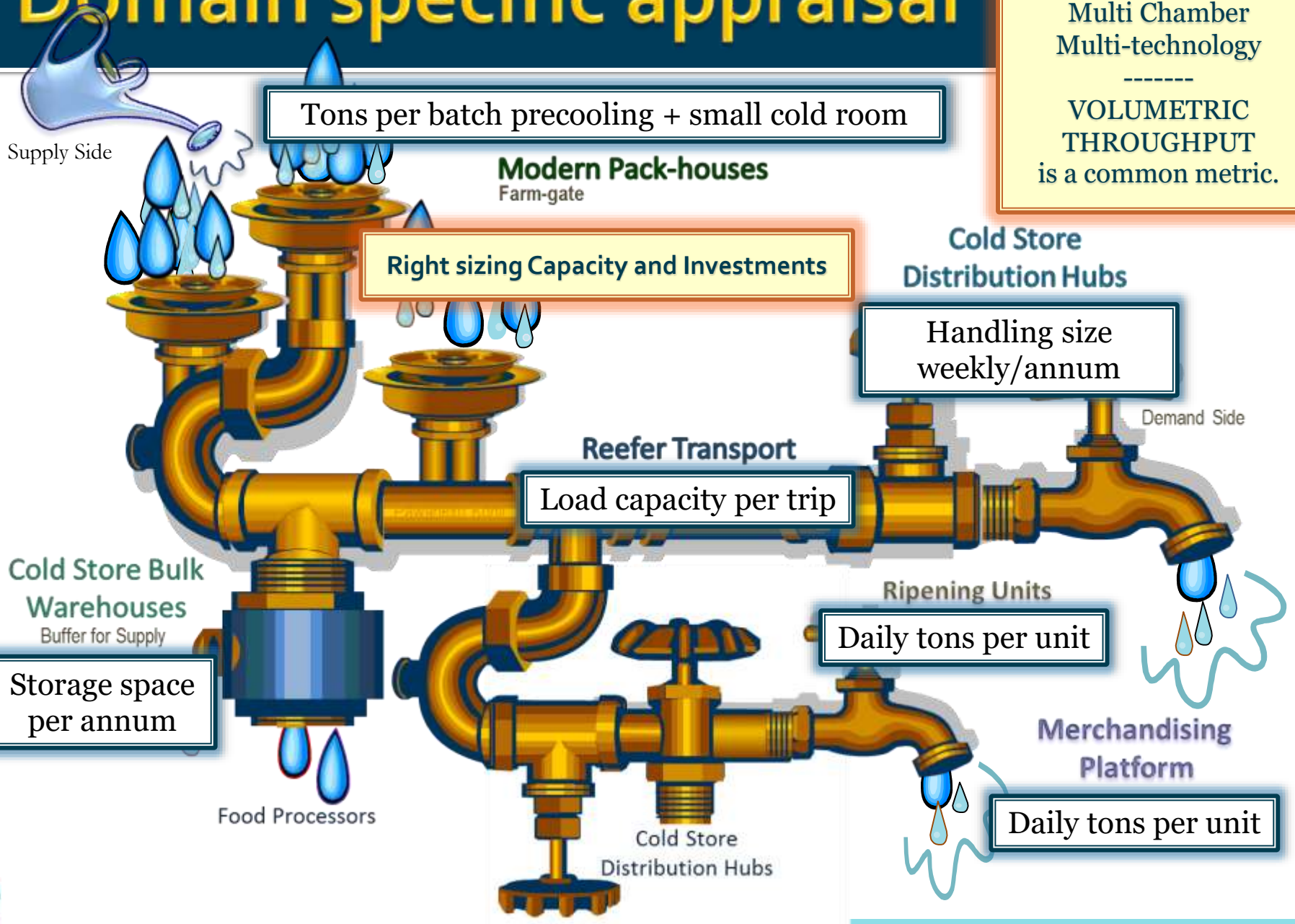
Zone	Cluster of Cities	Selected Major Consumption Centres/ Cities
North	Delhi	1. Delhi
South	Bangalore, Chennai & Hyderabad	2. Bangalore 3. Hyderabad 4. Chennai
East	Kolkata, North-24 Pragana	5. Kolkata
West	Mumbai, Thane, Ahmedabad, Pune, Jaipur, Surat	6. Mumbai 7. Ahmedabad 8. Jaipur
North- East	North Eastern States	9. Guwahati

- TOR finalised after discussions with stakeholder agencies (Sep-2014) under chairmanship of Addnl Secretary (DAC&FW) and published in the TFCP Report (Annexure-II).
- The assessment of primary information was thereafter applied to the total urban population of India for a wider basket of food items, provided more than 300 kms distance in the case of fresh horticulture produce.
- Assessment also extended to projecting requirements in 2020. However, cold-chain has a multiplier effect on markets, hence current consumption based needs would be more relevant than notional projections .

Domain specific appraisal

Multi-product
Multi Temperature
Multi Chamber
Multi-technology

VOLUMETRIC
THROUGHPUT
is a common metric.



Linking the Demand matrix

Integrated Cold-chain: Demand-time-volume Matrix "Solution Finder"

A.	Target Population	:	10,00,000		number	F.	Per capita consumption	:	0.85	kg/capita/month of target population
B.	Product to Handle	:	Banana		name	G.	Size of Reefer vehicle	:	10	metric tons carried per transport unit
C.	Product category	:	Mild-chill		category	H.	Distance from market	:	1200	kms from origin to destination
D.	Source (Origin)	:	Pack-house		type of origin	I.	Avg Speed of transport	:	450	avg kms travelled per day
E.	Holding at market	:	Yes	1	if "Yes", give days	J.	Reverse Logistics (Y/N)	:	No	Yes if getting return haulage

Solution finder:

Monthly Load	:	850	Tons per month	Daily market demand	:	28	tons per day - Banana supply required
Transit time	:	2.7	days or 64 hrs	Number of Vehicles	:	3	Transport units needed daily
Total Tonmiles	:	14913	roundtrip used	Total Vehicles needed	:	16	Total transport units for round trip
Market Share	:	100%	percent of population	Buffer Space needed	:	57	tons space at front-end storage

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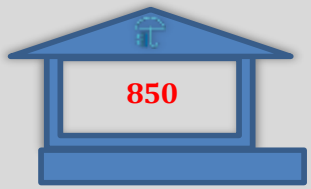
Developed by NCCD-Px

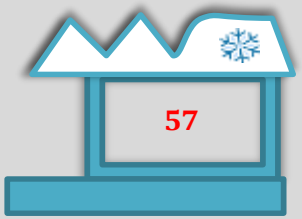
To fulfill your target market demand, you need:



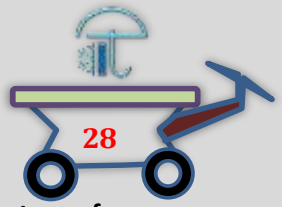
Production / Source
monthly output (tons)
equivalent to 2 packhouses

Reefer Vehicles are
needed to fulfil the demand

2.7 days
is travel time
from load point



space in MT
at cold store hub to
maintain required 1 day buffer



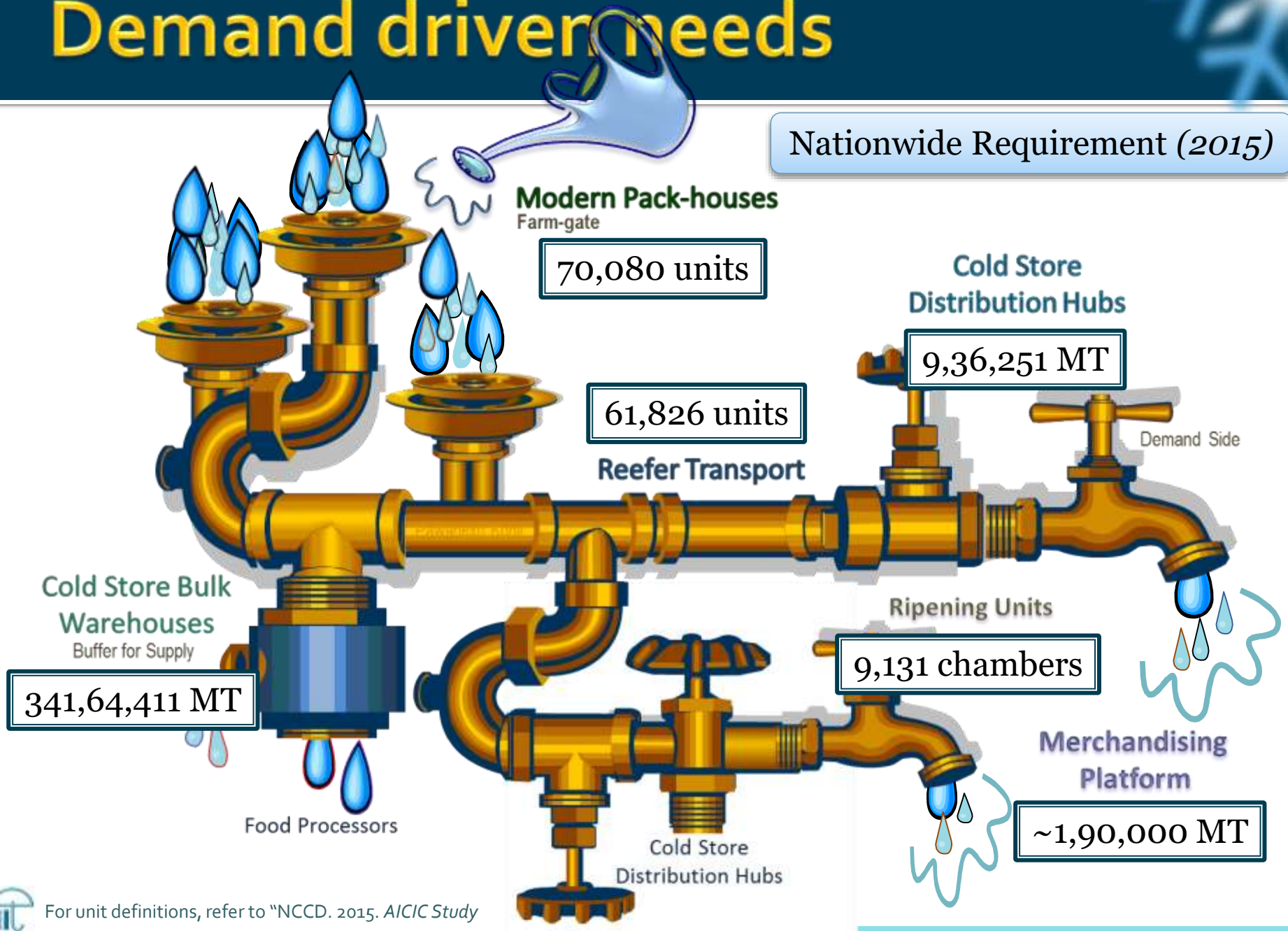
tons of space
for daily merchandising

Recommendations:

- Ensure transport and destination is capable of keeping 10-16°C range of temperature.
- You have selected a Mild-chill Product, hence it may be better to opt for insulation of 40 to 100mm PUF material.
- Always ensure that dispatch point has prepared the product at correct loading temperature. Avoid delays while loading.
- You may benefit economically and reduce the tonmiles by opting to carry other cargo on return trip.
- Your daily demand is less than 50MT, try and hold a minimum one day surplus in front-end cold storage hub.
- Space of 57 MT at Cold store (Hub), is indicative: dependant on packaging, type of product and last mile distances.

Demand driver needs

Nationwide Requirement *(2015)*



For unit definitions, refer to "NCCD. 2015. *AICIC Study*

All India Gap Assessment

Type of Infrastructure	Total Requirement (A)	All India Created (B)	All India Gap (A-B)	% share of Gap to Required
Modern Pack-house	70080 units	249 units	69831 units	99%
Reefer Transport	61826 units	9000 units	52826 units	85%
Ripening Chamber	9131 units	812 units	8319 units	91%
Cold Storage (Bulk)	34164411 MT	31823700 MT	3276962 MT	10%
Cold Storage (Hub)	936251 MT			

Not considering the cold storage capacity found non-functional or missing.
There may be Capacity off records in case of transport, reefers, ripening rooms

- The gap is large in case of pre-cooling/pack-houses, reefer transport and ripening units.
- Currently majority of infrastructure is in form of bulk cold stores. Currently, 75% capacity utilization on average is achieved.
- Uneven distribution, Produce from one State finds storage capacity in neighboring States.
- Mission is to develop integrated and synergistic infrastructure components, so that farmers and consumers will gain from supply chain.
- Since this report, an additional 1+ million tons in cold stores has been created.
- Estimated 4.8 mill ton storage may have shut down due to ageing, viability, etc.

Throughput capacity

#	Component	All India Requirement			
		Numbers	*Holding Size* ***MT***	*Annual Handling capacity* ***MT***	*Remarks*
1	**Integrated Pack-house**	**70080**	**11,21,280**	**13,45,53,600**	Preconditioning 16 tons a day for transit. Includes a pre-cooler and staging cold room with dispatch area for trucks. Can have processing units depending on crop
2	**Reefer Vehicles**	**62000**	**6,20,000**	**3,22,40,000**	Basis trip times. Reefer requirement can be scale 3 times basis various factors.
3	**Cold Storage (Bulk)**	**6833**	**341,64,411**	**3,41,64,411**	Cold store (Bulk) at average size of 5000 tons with average holding of 8 months.
4	**Cold Storage (Hub)**	**375**	**9,36,251**	**3,79,18,166**	Cold store (Hub) at average size of 2500 tons with holding period of 7 - 15 days.
5	**Ripening Chamber**	**9131**	**91,306**	**68,47,950**	Ripening Units of average throughput of 10 tons per day every 4 chambers
6	**Last mile**	**-**	**-**	**-**	POS retail, small vehicles for last-mile delivery & street carts form this segment.
	Totals	**148,419**	**369,33,248**	**2457,24,127**	**** Cumulative total***

State-wise Infrastructure assessed

State	Urban Population (2014-15)	% Share Population	Packhouse (No)	CS Bulk (MT)	CS Hub (MT)	Onion Storage (MT)	Ripening Chamber (MT)
Andhra Pradesh	18428602	4.46	3124	489195	41730	551273	4070
Arunachal	354419	0.09	60	6705	803	--	78
Assam	4774459	1.15	809	61185	10811	--	1054
Bihar	13008947	3.15	2205	5094524	29458	155936	2873
Chhattisgarh	6670958	1.61	1131	357519	15106	--	1473
Delhi	17718674	4.29	3003	--	40122	--	3913
Goa	1002786	0.24	170	--	2271	--	221
Gujarat	28523771	6.90	4835	2076936	64590	305066	6299
Haryana	9998498	2.42	1695	217754	22641	305686	2208
HP	722662	0.17	122	304511	1636	--	160
J&K	3807726	0.92	645	899220	8622	--	841
Jharkhand	8710072	2.11	1476	5228	19723	--	1923
Karnataka	25886395	6.26	4388	151695	58618	809817	5717
Kerala	19831340	4.80	3361	968	44906	--	4379
MP	21658925	5.24	3671	1146677	49045	1130550	4783
Maharashtra	54543414	13.19	9245	34200	123509	3063522	12045

** Pack house estimations are for the states, however will be based at production centres*

State-wise Infrastructure assessed

State	Urban Population (2014-15)	% Share Population	Packhouse (No)	CS Bulk (MT)	CS Hub (MT)	Onion Storage (MT)	Ripening Chamber (MT)
Manipur	943761	0.23	160	2925	2137	--	208
Meghalaya	651738	0.16	110	17228	1476	--	144
Mizoram	623469	0.15	106	7508	1412	--	138
Nagaland	676818	0.16	115	7142	1533	--	149
Odisha	7583316	1.83	1285	288328	17172	--	1675
Punjab	11227754	2.72	1903	1467249	25424	--	2479
Rajasthan	18558887	4.49	3146	11370	42025	337343	4098
Sikkim	210234	0.05	36	2145	476	--	46
Tamil Nadu	37817826	9.15	6410	109005	85635	--	8351
Telangana	12806317	3.10	2171	248130	28999	442517	2828
Tripura	1161198	0.28	197	5925	2629	--	256
Uttar Pradesh	48414644	11.71	8206	10565506	109631	72945	10691
Uttarakhand	3410752	0.82	578	10567797	7723	273893	753
West Bengal	31729218	7.67	5378	7888623	71848	--	7007
UT & Others			340	--	4539	--	443
All-India	**413461936**		**70080**	**42035195**	**936249**	**7448545**	**91305**

Procedures for Assessment

- A. Ripening Chamber:
  - Based on consumption demand of mango, banana and papaya, adjusted to ripening cycle (4 days)
- B. Integrated Pack house:
  - Consumption data from urban centres (city) considered as demand.
  - For each demand centre, a source / production point at a distance of greater than 300 km is considered for cold-chain intervention.
  - Unit Size: 16 MT throughput per day, working only in season of respective crop type.

Procedures for Assessment (Cont..)

- C. Reefer unit:
  - Carrying capacity of 10 MT assumed.
  - Maximum distance per day is 450 km (with an average speed of 30 km/ hr for 15 hr in a day).
  - Direct round trip has been considered to evaluate reefer vehicle requirement.
- D. Cold storage (hub):
  - Consumption demand and holding cycle of each product considered for estimation (Fruits & Vegetables: 7 days, Frozen Products: 15 days)

Procedures for Assessment (Cont..)

- E. Cold storage (bulk):
  - Assessed on basis of production for crops with 6 to 8 months holding cycle.
- Consumption across 9 cities for selected products calculated using 10 years NSSO household data.
- Regional consumption patterns assessed to apply to 414 mill urban population.
- Adjusted for consumption and holding periods and to apply to larger basket of food items.

Frequently Asked Questions

- Only Horticulture produce is considered and report is underestimated.
  - All relevant produce and products that benefit from using cold-chain have been covered.
  - Consumption demand for total 9 long term holding crops, 33 perishable items, milk products, meat products and frozen peas are included.
  - To allow for omissions, extra holding time in cold storage (hubs) were used.

FAQ – 2

- Milk distribution is not covered.
  - The report clearly mentions that Milk in liquid form has unique distribution system, and not included for this study.
  - Almost 30-35000 milk tankers are reported in use for liquid distribution and is well established.
  - A daily (or twice daily) collection system makes this a fast moving item with high throughputs.
  - Aseptically packaged milk is not using cold-chain except after opening the packet at consumer end.
  - However, consumption of Milk by-products is considered (ice cream, butter, etc.)

FAQ – 4

- Future potential is not explained.
  - The report was focused to be demand driven on the basis of current consumption of foods.
  - Estimate for 2020 have been projected.
  - However, consumption demographics are changing to various micro-factors and cold-chain will also impact such demand.
  - Large gaps exist in integrated cold-chain development and potential is self-evident.

FAQ – 5

- Almost 15 million tons of meats and fish is not addressed for storage needs.
  - The report explains the supply chain of foods. Meat products (livestock, poultry, fish) is supplied in regularly - daily frequency of operations.
  - 15 million tons translates into daily delivery of 41000 tons only.
  - This volume through cold store hubs is already factored by allowing for higher holding time of 15 days.

FAQ – 6

- Food processing equipment such as IQF lines and Blast freezers are not reported.
  - The report focuses on cold-chain as a service that handles product to-market linkage.
  - Food processing units are covered under manufacturing aspect of food processing and not cold-chain.
  - The output from such equipment is covered under consumption and cold-chain requirements.
  - Further, there was no data available on current production of food processing from such lines.

FAQ – 7

- NSEL reported a higher need for 61 mMT.
  - This study actually reports the need to create a much higher handling capacity, of 240 million MT in cold-chain.
  - The NSEL report was limited to estimating cold store capacity with purpose of seasonal price arbitrage.
  - AICIC report is more comprehensive and realistic as it is demand driven and supply chain oriented.
  - AICIC projects holistic infrastructure requirements to develop market linked integration in cold-chain.

FAQ – 8

- Report seems overly ambitious.
  - This study is not based on notional estimations but bears out as per realistic consumption data.
  - Household data from NSSO surveys for 10 years were used to assess the demand.
  - The infrastructure has been evaluated thereafter on basis of domain specific assessments.
  - Time and distance matrices have been applied where relevant and as per holding life of produce.
  - The report caters to an annual throughput of approximately 50 million tons to market, in cold-chain.

FAQ – 9

- The Statewise cold store gap totals to 9 million tons, but national level gap is only 3 million tons.
  - Cold store capacity can cater to production in adjoining regions. State boundaries do not restrict the cachement of cold stores.
  - Development may have regional variation due to availability of electricity, roads etc., but overall national need will not vary much.
  - Simplistic interpretation of Statewise data will not be relevant as will neglect other dynamics of this domain.

Considerations

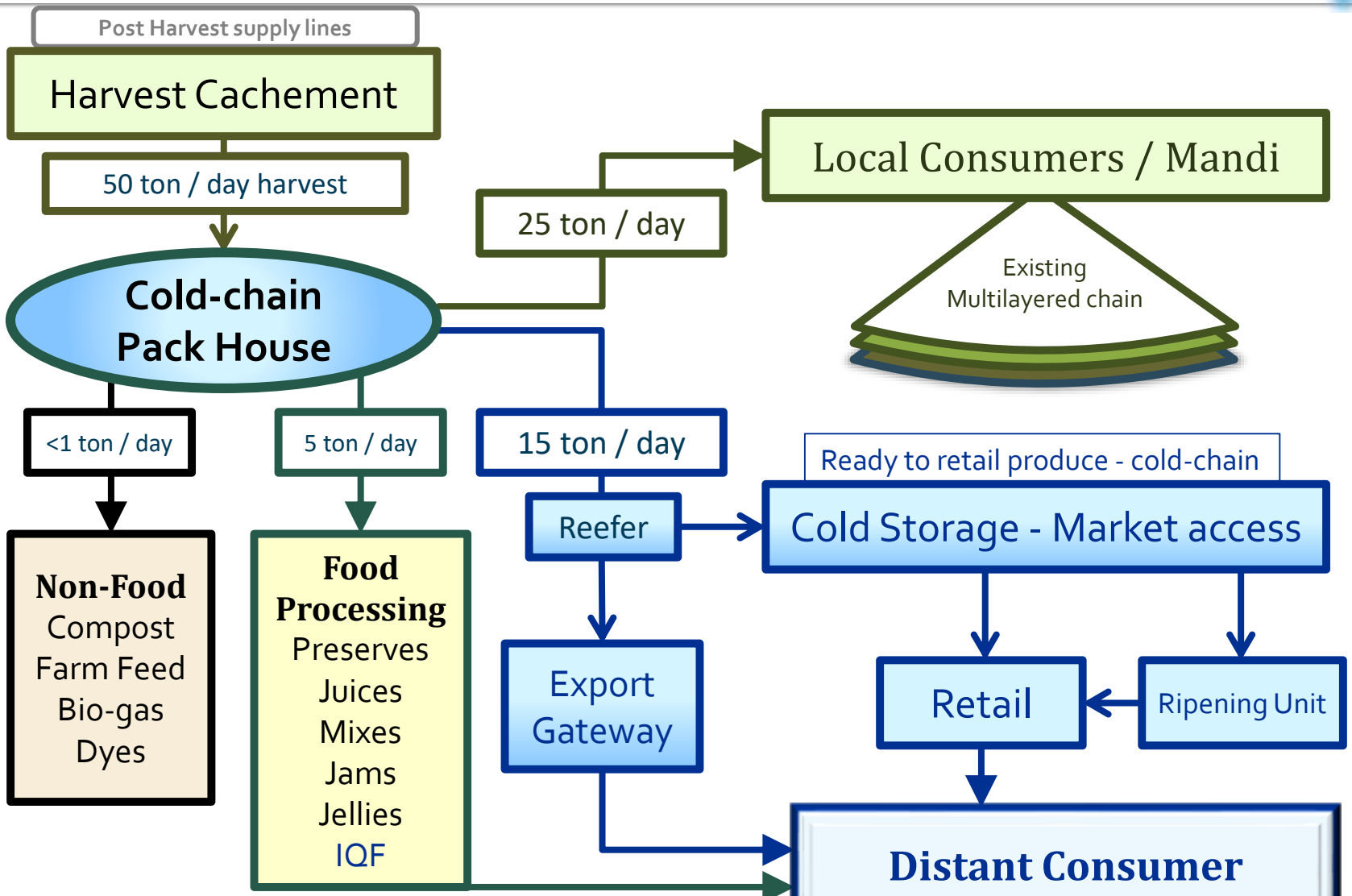
- Report is restricted to urban consumption, on assessing that produce within 24 hrs of production areas can be serviced without cold-chain.
- Pack-house numbers are for a unit size of 16 tons a day. In actual practice, modular units of larger sizes could be created.
- Every pack-house should create conjoined small food processing units which has not been assessed in this study.
- Ripening unit numbers could change with increased awareness of safely ripened fruits and affluence, which increases demand for fruits.
- Reefer units are assessed for a assumed size of 10 tons. Various micro factors would change actual numbers. Last mile transport not factored.
- Cold store (Hubs) would handle multiples in size as throughputs. In efficient supply chains, far lower holding periods can be expected.
- Food processing factories may use refrigeration at production stage or for captive storage. This is exclusive to their subsequent need for cold-chain.
- Conceptual level ambiguity requires clarity in definitions to harmonise understanding. A National Cold-chain Policy is a necessary next step.

Deck 3: Nerve centre and next level development

Strategy options

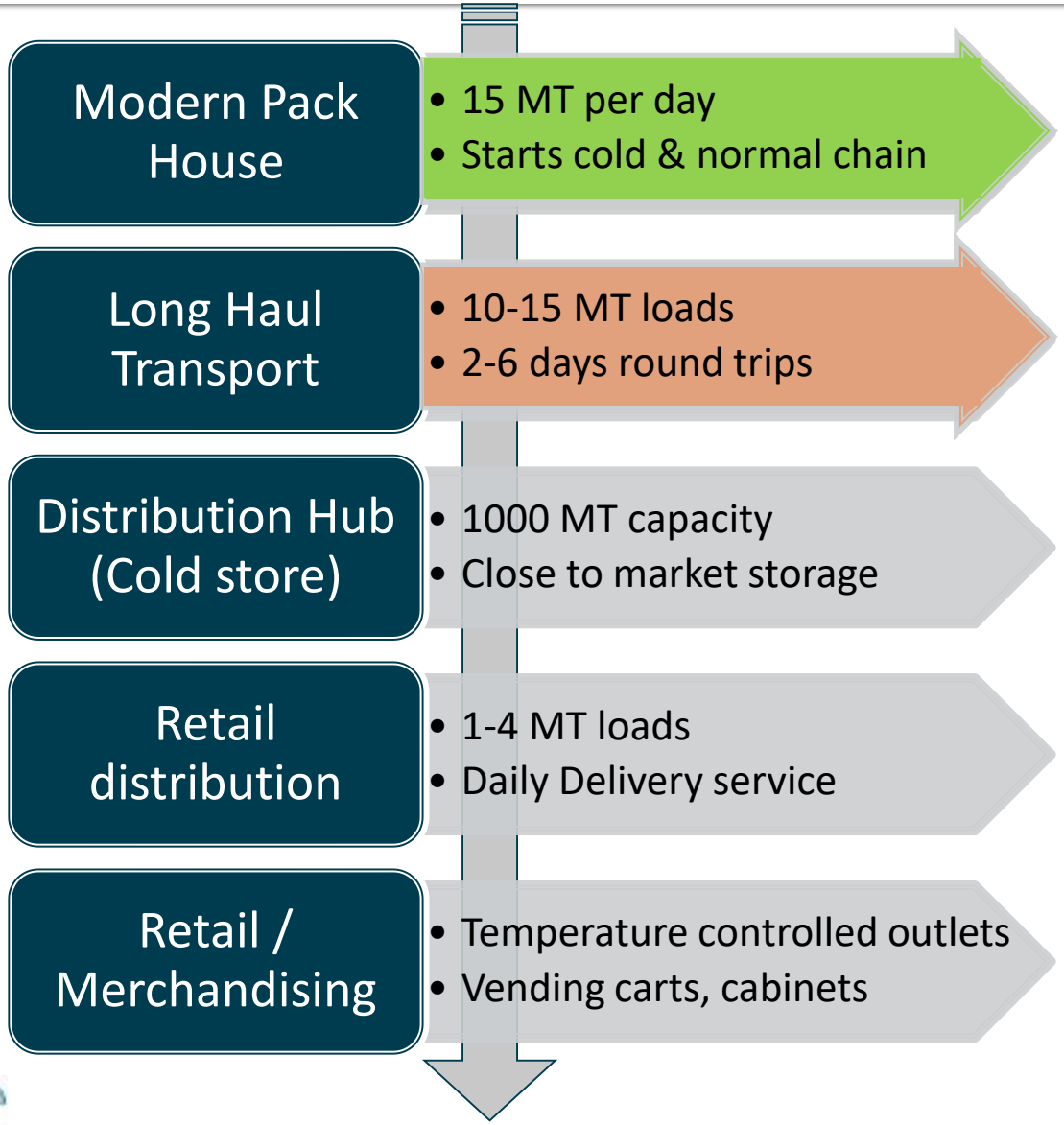
National Centre for Cold-chain Development

Nerve Centre



Each end point brings gainful end-use

Cold-chain Insight



Normally manned by Women
Assorting, Cleaning, Packaging, preconditioning, stage, dispatch

Rural Youth as reefer drivers
Return trips assured, promote reverse trade and commerce

Close to market Hubs that deconsolidate for retailers.
Generate demand information for advance planning of farmers.

Last mile buffer and serves on demand supply to consumer outlets. Street carts provide livelihood to urban poor.

Integrated – component value

Modern Pack House
- 15 MT per day
- Supplies cold & normal chain

7 units at Rs. 90 lakh each = 630 lakhs

Long Haul Transport
- 10-15 MT loads
- 2-3 days TAT

20 units at Rs. 30 lakh each = 600 lakhs

Distribution Hub (Cold store)
- 1000 MT capacity
- 10% or 100 MT for Horti

At Rs. 10,000 per ton = 100 lakhs

Retail distribution
- 2-4 MT loads
- Daily Delivery

Retail / Merchandising
- Temperature controlled
- Vending carts, cabinets

Component	Units	Cost	% of cost
Packhouses	7	630	47%
Reefers units	20	600	45%
Cold Store (MT)	1000	100	8%
TOTAL COST	1330 lakhs		

Target Beneficiaries

Type of Infrastructure	Beneficiaries
Modern Pack-house	FPOs, Cooperatives, Traders, Retailers, Logistics Service Providers, Mega Food Park promoters, agri-produce exporters
Cold Storage (Bulk)	Traders, Wholesalers, Logistics Service Providers
Cold Storage (Hub)	
Reefer Transport	Rural Youth, Logistics Service Providers, Pack-house and cold storage owners
Ripening Chamber	Retailers, Cold store Hubs, Logistics Service Providers

- Approach prospective beneficiaries with concept to promote 'end-to-end' seamless connectivity from farm to wholesale.
- Empower existing asset owners with ability to extend into other aspects of agri-business value chain.

Strategy for Development

Capacity building on need assessment	• Develop implementing agencies
Program awareness	• Implementing agencies to promote awareness, projectise needs
Fast track applications	• Speed up assistance process
Feedback on activities	• Harmonise database and feedback
Expansion and scale up of existing	• Modernisation and upgradation
Application based research	• Management and handling protocols for indigenous crops

NCCD: Strengthening Cold-chain Development

- Industry, PSUs, Government, Investors, Entrepreneurs, Farming Associations & Knowledge Houses - All Working Together!

Defining - Rationalising - Harmonising
Making India's Cold-chains Smarter

Thank You
धन्यवाद्

National Centre for Cold-chain Development
राष्ट्रीय कोल्ड-चेन विकास केंद्र

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