

National Council on Electricity Policy Annual Meeting September 22-23, 2022

Breakfast: 8:00AM – 9:00AM Welcome: 9:00AM

Visit <u>www.naruc.org/ncep/meetings</u> for an online agenda and speaker/moderator biographies

Wifi: MarriottBonvoy_Guest

Welcome and Special Guests



ToNola Brown-Bland, NCEP President Joe Paladino, Department of Energy Ted Trabue, District of Columbia Sustainable Energy Utility

Customer Empowerment

ToNola Brown-Bland, NCEP President

Jay Oliver, Duke Energy Jeff Riles, Microsoft Keishaa Austin, Rewiring America



BREAK Return at 11:05AM

<u>Agenda:</u> <u>www.naruc.org/ncep/meetings/</u>



Access and Energy Justice



Jennifer Easler, Iowa Consumer Advocate

Jane English, NAACP

Marnese Jackson, Midwest Building Decarbonization Coalition

Andrew Bennett, Energy Outreach Colorado

<u>Agenda:</u> <u>www.naruc.org/ncep/meetings/</u>

Consent to Disclose Utility Customer Data	SRC Subscriber Agency Agreement For Xcel Energy Solar*Rewards Community Service (Colorado) Colorado	
To be completed by the customer ***Catomer data can provide insight into activities within the premises incoiving utility service. Your utility may not disclose your customer data encept (1) if you authorize the disclosure, (2) to contracted agents that perform services on behall of the utility, or (3) as otherwise permitted or required by leave or regulations. *** ***You are not required to authorize the disclosure of your customer data. Not authorizing disclosure will not affect your utility services. *** ***You are not required to authorize the disclosure of your customer data. Not authorizing disclosure will not affect your utility services. *** ***You are not explained to authorize the disclosure of your customer data disclosed present the form. ***You are not proved to failed docted constant and will not constant, and will not be negonable for monitoring or taking any staps to ensure that the data negister maintains the confidentially of the data or uses the data as authorized by/our. Please be advised that you may not be able to control the the data or uses the data activities of your customer data docted present the ervit advisor of the not relaxed.**** **** In addition to the customer data doore, the data negister they give preserve the following from your utility your genere, account number; service number; **** In addition to the customer data doore, the data negister they give to the customer data doore, the data negister they available for mover utility or genere; account number; service number; ****	 Term of Agency and Termination. Baytersentation and Advowledgement. Sing Subscriber and Sing Chabarolar is a security of the SVE Subscriber and Sing Chabarolar is and save and	
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PLEASE READ THE CUSTOMER DISCLOSURES ABOVE By signing this from you acknowkdogs and agree that you are the customer of record for this account and that you authorize your utility service provider to disclose your customer data as anyocided in this form.	of an efforcine assignment by SRD Producer of such contract, where Public Service has construct to such assignment in writing has directive data of a replacament agreery agrowment between SRD Subscriber and the new owner or subscriber organization of the Py System Hart has taken assignment of such assignment agreery agrowment between SRD Subscriber and the new owner or subscriber organization of the Py System Hart has taken assignment of such assignment agreery agrowment between SRD Subscriber and the new owner or subscriber organization of the Py System Hart has taken assignment of such	Low Income Verification Form
Castomer account number Sarvice address Printed name Signature of castomer of record	contract from SRC Producar. SRC SUBSCRIBER By Titile Titile Date	The purpose of this form is to verify that the Xcel Energy customer stated below is an active participant in the representing organization shown below. This form is required for acceptance of low income subscribers into Xcel Energy's Solar*Rewards Community Program. Low income subscribers must be verified by one of the following representing organizations: Energy Outreach Colorado The Atmosphere Conservancy Colorado LEAP Program Municipal Housing Authority (ex: Denver Housing Authority)
	Colorado (Colorado Xcel Energy*	Grid Alternatives Xcel Energy Customer Information:
	SRC SUBSCRIBER AGENCY AGREEMENT FOR XCEL ENERGY	Customer Name:
onsent to Disclose Utility Customer Data	SOLAB*REWARDS COMMUNITY SERVICE (COLOBADO)	Customer Account Number:
requested information must be provided for the consent to be valid. This form may be available in other languages. To obtain a copy in another language,		
sse contact inquire exocelene gy.com: Para outerier una copia de este rominuano en españor, por tavor contacte a su proveedor de servicos publicos	SRC Subscriber Name:	Customer Premise Number:
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sical and mailing address P.U. Box 8, Eau Claire, WI, 54702	SRC Subscriber E-mail Address:	Customer City, State, Zip:
B00.895.4999 Email datarequest@xcelenergy.com Fax 866.208.8732	SRC Subscriber Mailing Address:	Solar Garden ID:
additional information, including the utility's privacy policy, visit xcelenergy.com.	SRC Subscriber Telephone No: (Primary) (Alt.)	
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tact name (if available)	The undersigned SRC Subscriber hereby authorizesee attached VPunic Service in Producer () and SRC Producer hereby accepts the responsibility, to act ("SRC Producer (), and SRC Producer hereby accepts the responsibility to act and SRC Subscriber's electric service bill was incorrect, SRC Producer shall be accepted by the responsibility to act and SRC Producer hereby accepts the responsibility. To act	Name: (printed)
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III Solargenergyvoureach.org Pax	the Photovitate Energy and associated Henewood Energy Versits generated by, and delivered to Public Service from, the Photovitate Energy System ("PV System" Versities and other SPC subscriber and other SPC subscribers winno subscriptions in the PV System. SPC Subscriber acknowledges and	Signature:
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electric istealli in fidullatigas	Colorado Public Utilities Commission ("Commission") and in effect from time to time.	
intormation regarding your participation in renewable energy, demand-side management, load management, energy emclency or other utility programs	 Duties of SRC Producer Generally. SRC Producer shall be responsible for issuing and managing the subscriptions of all SRC subscribers in the PV System communicated to rubin communicated to Public Service by SRC Producer. In common communicated to Public Service by SRC Producer. In common communicated to Public Service by SRC Producer. 	
utner (specify)	and for selling to Public Service the subscribed and unsubscribed portions of the Photovoltaic Energy and associated Renewable Energy Credits generated respect to the PV System SRC Subscriber hereby authorizes Public Service with	
information will be used to:	by the PV System and delivered to Public Service at the production meter located at the PV System site. In performing such functions, SRC Producer Subscriber's bills for retail electric service for all relevant periods, as may be	
Provide you with products or services you requested	shall be solely responsible for communicating directly to Public Service SRC Subscriber's information concerning its subscription in the PV System.	*A legal representative of the representing organization
Determine your enguinty for an energy program Analyze your energy usage	including its benchical intervention in the Photovoltate Lengry and associated Renewable Energy Credits generated and produced by the PV System. SRC Suberchiber advanced the Daket Service and Inspection and SRC Subscriber's agent with respect to SRC Subscriber's	inis form must be completed and uploaded for each low income subscriber to a solar garden. Updated 1/26/2017
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u may terminate this consent at any time by sending a written request with your name and service address to your utility.		
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	2103/28	

The Midwest Building Decarbonization Coalition



A STRATEGY FRAMEWORK FOR JUST TRANSITION RESIST — RETHINK — RESTRUCTURE



Natural Gas Prices

(Dollars per Thousand Cubic Feet, except where noted)

Area: U.S.

Period: Monthly

🔟 Download Series History 🛛 🚺	Definitions, So	urces & Notes						
Show Data By: Data Series Area	Graph Clear	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	View History
Wellhead Price	◆~ □	NA	NA	NA	NA	NA	NA	1973-2022
Imports Price	۰.	6.87	5.62	4.67	5.46	6.68	6.98	1989-2022
By Pipeline	\$	6.16	5.20	4.41	5.46	6.67	6.98	1997-2022
As Liquefied Natural Gas	\$	39.06	29.59	30.57	w	12.72	W	1997-2022
Exports Price	\$-	7.04	8.22	7.25	8.46	10.31	11.47	1989-2022
By Pipeline	\$-	4.95	5.53	4.71	6.04	7.62	7.97	1997-2022
As Liquefied Natural Gas	\$-	8.56	10.17	9.15	10.33	12.33	14.37	1997-2022
Citygate Price	\$-	5.33	5.78	5.59	6.34	8.41	10.12	1973-2022
Residential Price	\$	12.04	12.17	12.98	13.65	17.55	22.73	1973-2022
Percentage of Total Residential Deliveries included in Prices	}	96.9	96.7	96.6	96.4	96.2	96.3	2002-2022
Commercial Price	♦	9.76	10.04	10.25	10.48	12.04	13.53	1973-2022
Percentage of Total Commercial Deliveries included in Prices	•	71.3	70.1	68.4	65.7	60.9	57.3	1983-2022
Industrial Price	\$-	6.65	7.53	6.32	6.81	8.31	9.66	2001-2022
Percentage of Total Industrial Deliveries included in Prices		13.3	14.1	14.2	14.1	13.4	13.1	2001-2022
Electric Power Price		6 15	6.26	5 32	6.45	7 77	8 22	2002 2022

×

Average retail price of electricity, monthly



Pembroke, IL Rural Residential Electrification Pilot

The Midwest BDC is working with the Community Development Corporation of Pembroke Hopkins Park (IL), RMI, Slipstream, and local labor to demonstrate a decarbonized future with an electrification pilot in this rural community.







STANCE TOWARDS COMMUNITY	IGNORE	INFORM	CONSULT	INVOLVE	COLLABORATE 5	DEFER TO	
ІМРАСТ	Marginalization	Preparation or Placation	Limited Voice or Tokenization	Voice	Delegated Power	Community Ownership Foster democratic	
COMMUNITY ENGAGEMENT GOALS	Deny access to decision-making processes	Provide the community with relevant information	Gather input from the community	Ensure community needs and assets are integrated into process & inform planning	capacity to play a leadership role in decision-making and the implementation of decisions.	participation and equit through community- driven decision- making; Bridge divide between community & governance	
MESSAGE TO COMMUNITY	Your voice, needs & interests do not matter	We will keep you informed	We care what you think	You are making us think, (and therefore act) differently about the issue	Your leadership and expertise are critical to how we address the issue	It's time to unlock collective power and capacity for transformative solutions	
ACTIVITIES	Closed door meeting Misinformation Systematic Disenfranchisement Voter suppression	Fact sheets Open Houses Presentations Billboards Videos	Public Comment Focus Groups Community Forums Surveys	Community organizing & advocacy Interactive workshops Polling Community forums	MOU's with Community-based organizations Citizen advisory committees Collaborative Data Analysis	Community-driven planning and governance Consensus building Participatory action research Participatory budgeting	



LUNCH Return at 1:15PM

<u>Agenda:</u> <u>www.naruc.org/ncep/meetings/</u>



Resilience and the Local Economy

Eric Koch, Indiana State Senator

Charlie Bayless, North Carolina Electric Cooperatives

Karyn Boenker, Pacific Northwest National Laboratory

Matt Malinowski, Collaborative Labelling and Appliance Standards Program (CLASP)

<u>Agenda:</u> <u>www.naruc.org/ncep/meetings/</u>



NC 103,000 Co-ops Miles of Distribution Lines

Duke 145,000 NC Miles of Distribution Lines



NC Electric Cooperatives

DER, Microgrids, and Resilience









Distribution Operator

A single entity that monitors, aggregates and dispatches DER & DR, improving reliability by providing visibility and coordinated action



Grid Modernization Laboratory Consortium Technical Assistance for Oregon Public Utility Commission

- Juliet Homer Pacific Northwest National Laboratory
- Karyn Boenker Pacific Northwest National Laboratory
- Kostas Oikonomou Pacific Northwest National Laboratory
- Rebecca Tapio Pacific Northwest National Laboratory
- Alice Lippert Argonne National Laboratory
- ► Todd Levin Argonne National Laboratory
- ► Hope Corsair Oak Ridge National Laboratory
- ► Larry Markel Oak Ridge National Laboratory













OR HB 2021 (2021)

Passed during a historic heat wave that followed a historic freeze and wildfire season.

Requires 100% clean electricity by 2040 overseen by OPUC via Clean Energy Plans.

In addition to meeting emissions reductions targets, Clean Energy Plans must also:

Include a risk-based examination of resiliency opportunities that includes costs, consequences, outcomes, and benefits based on reasonable and prudent industry resiliency standards and guidelines established by the Public Utility Commission."



Resilience vs. Reliability



- OR HB2021 Sec.29(5) "Energy resilience" means the ability of energy systems, from production through delivery to endusers, to withstand and restore energy delivery rapidly following nonroutine disruptions of severe impact or duration.
- ► DOE GMLC (<u>Petit 2020</u>)
 - Resilience: The ability of the system to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions, including the ability to withstand and recover from deliberate attacks, accidents, or naturally occurring threats or incidents.
 - Reliability: The ability of the system or its components to withstand instability, uncontrolled events, cascading failures, or unanticipated loss of system components.
- The Hawaii Resilience Working Group Report for Integrated Planning (2020)



Most reliability events are generally high probability/low consequence events while resilience events are singular, infrequent largescale incidents like hurricanes, earthquakes, and terrorist attacks with more severe consequence.



Resilience Planning and Metrics

DOE GMLC (<u>Petit 2020</u>):

Define resilience goals

Develop system and resilience metrics

Characterize threats and their probabilities and consequences

Evaluate effectiveness and cost of alternative resilience measures for avoiding or mitigating threats



Levels of Resilience

From <u>toolkit.climate.gov</u>: "Community efforts to build climate resilience are increasingly seen as opportunities to prepare for new climate conditions, reduce emissions of greenhouse gases, and address issues of social equity."





Climate Mapping for Resilience and Adaptation (CMRA) integrates information from across the Federal Government to help people consider their local exposure to climate-related hazards.

The site also points users to federal grant funds for climate resilience projects, including those available through the Bipartisan Infrastructure Law.

Climate-related hazards in real-time

Climate-related hazards are affecting U.S. communities every day. View real-time statistics and maps documenting where people, property, and infrastructure may be exposed to hazards. Click any hazard below to display its associated map. Click areas of interest on any map for more information.





Community Resilience – Zone of Tolerance

- Esmaliann et al. (2021) assesses and identifies factors affecting risk disparity due to infrastructure service disruptions in extreme weather events.
- They propose a model that characterizes societal risks at the household level





- Using NERC/FERC Reliability Metrics to Assess Resilience
- Community and System Threat Identification and Risk Assessments
- Bowtie Risk Assessment Process
- Climate Change Vulnerability Assessment + ConEd and SCE examples
- Accounting for Variations in Hardship, Consequences, and Costs
- Weighting and Scoring Methods for Populations at Risk
- Customer Vulnerability and Resilience Mapping
- Opportunities for Investing in Resilience
- Microgrids and Resilience Hubs
- ► ICE Calculator



wapping ACs for Heat Pumps





CLASP improves the energy and environmental performance of the appliances & equipment we use every day, accelerating our transition to a more sustainable world.

Affordable, low-impact, high-quality appliances, lighting & equipment



Climate



- Reduce carbon emissions
- Lower operating costs
- Decrease energy demand

Clean Energy Access



- Reduce energy supply cost
- Increase energy access
- Improve quality of life

Introduction



Goal:

Transition to clean, efficient heat

Cost-effectively

At speed and scale

What Is This?







A Huge Opportunity for Decarbonization





https://www.ruud.com/products/hvac/

Air-conditioning, Heating, & Refrigeration Institute (AHRI), "AHRI Releases December 2021 US Heating and Cooling Equipment Shipment Data", February 11, 2022, pp. 3-4.

How Would This Look Over Time





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How Does it Work?





- Could eliminate 39% of fossil fuel heating
- 11% utility bill and CO₂ reductions (50 MtCO2e annually in 2032)





- Short-term solution (next 5 years)
 - Full electrification should take first priority
- Fewer barriers
 - Drop-in replacement using existing technology
 - Less concerns about fuel switching
 - Low-up front cost and \$256 average annual heating bill savings
 - \$400-\$500 for oil, propane, or electric resistance
 - Less impact on the electric grid


Waite, M. and V. Modi (2020a), "Electricity Load Implications of Space Heating Decarbonization Pathways," Joule 4, 376–394, February 19, 2020.

How to Get It Done?



Congress

• HEATR and ICEE-HOT Acts

Federal Programs

- DOE Standards
- ENERGY STAR
- Weatherization
- Federal buildings

State Standards

• Two-way operation requirement similar to water heater DR port

Building Codes

- Proposed amendment to Denver's building ordinance
- NBI Building Decarb Code

Utility Incentive Programs

CEE Split Central Air Conditioner (CAC) Specification





Find out More



New report by CLASP and Regulatory Assistance Project (RAP)



- Benefits for each state and heating fuel
- <u>https://www.clasp.ngo/research/all/</u> <u>ac-to-heat-pumps/</u>
- Or scan here:





MATT MALINOWSKI Director of Climate Research | mmalinowski@clasp.ngo



clasp.ngo

BREAK Return at 2:30PM

<u>Agenda:</u> <u>www.naruc.org/ncep/meetings/</u>



Keynote



Dr. Tony Reames, U.S. Department of Energy

<u>Agenda:</u> <u>www.naruc.org/ncep/meetings/</u> The National Council on Electricity Policy presents

The 2022 Brinch Award for Collaboration in the Public Interest

to

Dr. Tony Reames

September 22, 2022

Data Ownership, Privacy, and Security



Sarah Freeman, Indiana Utility Regulatory Commission

Catherine Tomasi, Consolidated Edison

Devin Hampton, UtilityAPI

Sanem Kabaca, Oracle Energy and Water

<u>Agenda:</u> <u>www.naruc.org/ncep/meetings/</u>

Bonus Session: DOE National Transmission Planning Study Overview and Feedback Opportunity



Carl Mas and Hamody Hindi, *Grid Deployment Office, Department of Energy*

<u>Agenda:</u> <u>www.naruc.org/ncep/meetings/</u>



National Transmission Planning Study

Carl Mas & Hamody Hindi

September 22, 2022

https://www.energy.gov/gdo/national-transmission-planning-study



Building a Better Grid Initiative





Project Team

 This study is being conducted by a joint National Renewable Energy Laboratory (NREL) and Pacific Northwest National Laboratory (PNNL) project team

 This study builds on past projects and expertise at NREL and PNNL with the support and direction of DOE's Office of Electricity











Office of Electricity

North American Energy Resilience Model



Objectives of the Study

1 Identify interregional and national strategies to accelerate costeffective decarbonization while maintaining system reliability

2 Inform regional and interregional transmission planning processes, particularly by engaging stakeholders in dialogue

3 Identify viable and efficient transmission options that will provide broad-scale benefits to electric customers



Desired outcomes of the Study

Results help prioritize future DOE funding for transmission infrastructure support

Results help fill existing gaps within interregional transmission planning





What the Study it is and is not doing

What the study will do

- Link several long-term and short-term power system models to test a number of transmission buildout scenarios
- Inform existing planning processes
- Test transmission options that lie outside current planning
- Provide a wide range of economic, reliability, and resilience indicators for each transmission scenario

What the study <u>will not do</u>

- Replace existing regional and utility planning processes
- Site individual transmission line routes
- Address the detailed environmental impacts of potential future transmission lines
- Provide results that are as granular as planning done by utilities
- Develop detailed plans of service



National Transmission Planning Study Scope





National Transmission Planning Study Scope





Public Engagement: Four Aspects

Public Workshops and Input	 Introduce project and provide updates Share interim and final results Provide opportunities for public feedback via website
Existing Convenor Groups	 Validate data and input assumptions Discuss consistency with groups' existing efforts Share project updates and interim results
Technical Review Committee	 Provide project input Suggest project course corrections Review interim results
Tribal Outreach	 Initiate broad outreach to all Tribes Invite statements of interest Incorporate Tribal input into analysis



Public Engagement: Four Aspects cont'd



Technical Review Committee

Technical Review Committee (TRC) will constructively scrutinize and review the overall project and, where needed, will provide a forum for integrating input from all three subcommittees.

- **Government Subcommittee** will provide feedback on how to reflect federal and state policy and regulatory issues in the analysis.
- **Modeling Subcommittee** will provide technical feedback on assumptions, modeling, and data.
- Land Use and Environmental Exclusions Subcommittee will provide feedback on generalized issues related to constraints on locating new transmission and generation.





Recent State Survey

NTP Study team reviewed assumptions for:

- Existing state policies for clean energy, emission reductions
- Annual and peak demand under scenarios representing different possibilities for load growth



Grid Deployment Office

Feedback gathered directly from nearly 40 states plus Washington DC, leading to changes in the approach for demand forecasts and revisions to state policy assumptions

Revisions coordinated with the Atlantic Offshore Wind Transmission Study and leveraged recent analysis from Evolved Energy Research's Annual Decarbonization Perspective

Timeline





National Transmission Planning Study Scope





Baseline Analysis: Incorporating Additional Renewables

- Start from Industry Baseline
 2030 system
- Add renewable generation to more fully utilize planned 2030 transmission
- Answer the question: How close does the currentlyplanned 2030 system + additional renewables get to meeting the country's 2035 decarbonization goal?



From DOE EERE Renewable Energy Resource Assessment Information for the United States (March 2022)



National Transmission Planning Study Scope





Scenario Analysis: Study Plan





Scenario Analysis: Key Tasks

- Define different scenarios or storylines to identify potential future generation resources and transmission expansion options
- Conduct capacity expansion modeling
 - Independently, identify potential interregional renewable energy zones
- Conduct production cost modeling
- Conduct AC power flow and dynamic reliability analysis
- Conduct economic analysis
- Conduct stress case and resource adequacy analysis
- Identify a portfolio of potential transmission options



Scenario Characteristics



Topology

- Macrogrid Overlay
- Interconnection-Wide Expansion
- Intra-Balancing Area
- Technology & Cost
- Existing Technology & Costs
- High Costs
- Voltage Source Converters
- Non-wires Alternatives (e.g., FACTS, DLR, etc.)



Electrification

- High
- Medium
- Low

Distributed energy resources

- High
- Medium
- Low



Generation Drivers

Renewable siting

- Open
- Reference
- Constrained

RE & Storage Costs

- High
- Medium
- Low
- Thermal fleet
- Nuclear fleet extension
- Clean firm capacity
- Carbon capture and sequestration



Proposed Scenario Framework





4 transmission paradigms



Intra-interconnection: expansion between 134 model zones



Macrogrid: multi-terminal HVDC-VSC



- 1. High transmission costs \rightarrow 2–10x default assumptions
- 2. High distributed PV adoption \rightarrow 170 GW in 2035 (default = 93 GW)
- 3. Low solar & storage costs \rightarrow ATB Advanced

· Default = ATB Moderate

- 4. Low wind costs \rightarrow ATB Advanced
- 5 & 6. Lower & Higher fossil fuel prices \rightarrow AEO 2022 cases
- 7. Higher clean fuel (e.g., H₂) costs
- 8. Constrained renewable energy \rightarrow Limited Access (see next slide)



Constrained renewable energy siting

Developable wind resource potential

Default: Reference Access (6.7 TW)

Constrained: Limited Access (2.1 TW)



Standard exclusions: federal, state, and local restrictions; complex terrain; radar, shadow flicker; setbacks to infrastructure (1.1x max tip-height to buildings, roads, railroads, transmission lines); others Key difference between Constrained and Default is the setback: 3x max tip-height.



- 9. Higher demand flexibility (represented by an adjusted load profile)
- 10. Increased coordination for resource adequacy and capacity crediting
- 11. Climate impact sensitivity
- 12.Limited non-RE techs \rightarrow no CCS, no new nuclear
- 13.Expanded non-RE techs \rightarrow incl. CO₂ removal, nuclear-SMR ^J conventional nuclear



Default allows new

fossil CCS and

Illustrative examples of how drivers can impact outcomes





Illustrative modeling results only



THANK YOU

- Overview of NTP Study goals and objectives
- Project news and milestone results
- Webinar presentations
- NTP Study mailing list
- TRC meeting schedules and presentation materials
- Public comment form



https://www.energy.gov/gdo/national-transmission-planning-study



WRAP UP

Friday:

Breakfast: 8:00 – 9:00 AM Start time: 9:00 AM

